LIGHT, JUNE 22, 1939 FIRST AERO WEEKLY IN THE WORLD REGD. AT THE G.P.O. AS A NEWSPAPER

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# FLIGHT

and The AIRCRAFT ENGINEER

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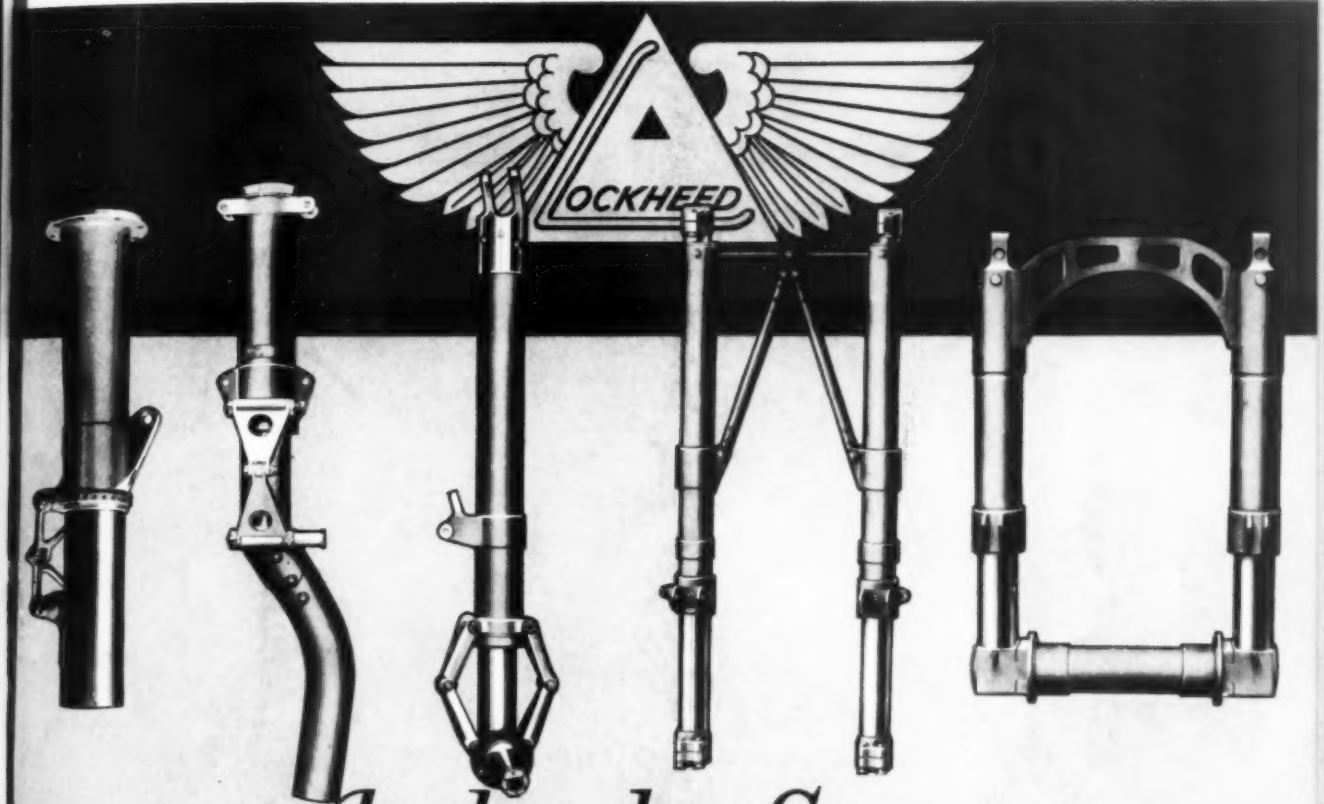
1591
XXXV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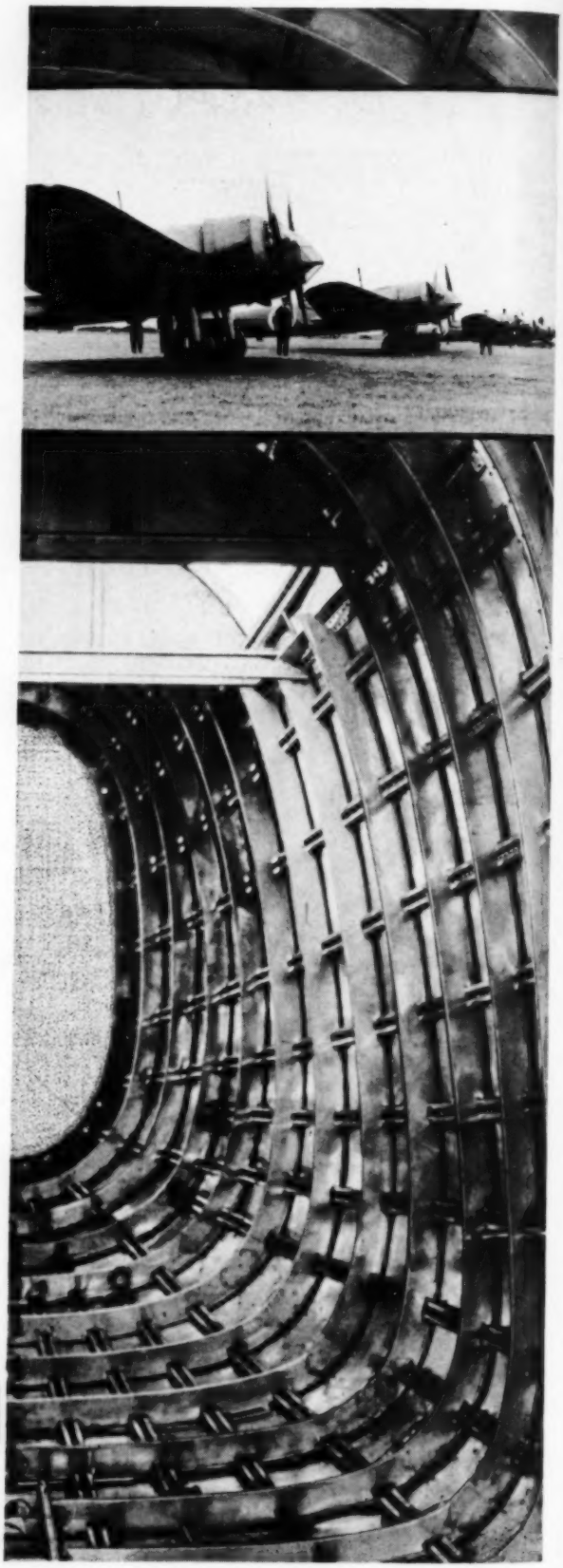
It was there dismantled and its components submitted to test and inspection, and subsequent Inspection Department reports showed that the aircraft was in excellent condition throughout. No replacements were required, and the protective treatment applied to the metal surfaces had proved to be fully effective. The report showed that a few pipes, together with certain fairings, exhaust fittings and gill rings, could be replaced by later modified types. The aircraft was re-assembled and repainted for return to service, structurally as good as new.



"Bristol"

**BLENHEIM BOMBER**

THE BRISTOL AEROPLANE COMPANY LTD., FILTON, BRISTOL.

# FLIGHT
and The AIRCRAFT ENGINEER

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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# The Outlook

## Strategy and A.R.P.

THE Air Raid Defence League has just issued a bulletin (No. 4) under the title of "The Nature of the Threat," which everybody ought to read. In the main it follows the views which have been set forth in *Flight*, and so we shall be aquitted of conceit if we say that the bulletin is wisely conceived.

The argument is based on an examination of the strategic possibilities of bombing, and only glances cursorily (though quite adequately) at the tactical details involved. It sets forth the possibilities as probably envisaged by the German high command. There is evidence that Germany is organised for a *Blitzkrieg*, or lightning war, which would involve heavy attacks by land on her continental opponents and a heavy air attack on Great Britain. For both strategical and tactical reasons this last would probably be directed on the residential areas of London, and the bulletin calculates that in the first day or days of war some 1,400 bombers might attack London in half-hourly waves of thirty machines at a time. If half the number got through, seventy tons of bombs might be dropped, and the casualties might be fifty per ton, i.e., 35,000. But that effort could not be sustained for long. After three or four days the intensity of the raiding would necessarily wane. Soon it would be manifest whether the *Blitzkrieg* had succeeded or failed. The bulletin agrees with *Flight* that it would fail.

Once it had obviously failed, the German strategy would change, and the development of land warfare would force the bombers to seek other targets. What the bulletin calls "normal" raiding would ensue, directed mostly against military targets instead of against the civilian population, and far less intense.

The bulletin argues that our active defence cannot defeat the attempts at victory in the *Blitzkrieg* policy, though it can inflict such heavy losses that it would curtail its duration. But the enemy can be robbed of their hoped-for triumph by effective civilian defence—in short by A.R.P. If panic is averted, the *Blitzkrieg* will have failed.

The bulletin again follows *Flight* in criticising attempts to "do something for everybody," and in advocating that what we need is to do "a great deal for some of the people." The distribution of gas masks to remote villages in Northern Ireland and suchlike has been a waste of effort. A.R.P. efforts ought to be concentrated on the areas most likely to be attacked.

## The Inviolable Sea

THE urge of A.R.P. has made most civilians wish that the air had never been conquered by man, and that Britons could still sleep sound at nights guarded by "the inviolable sea" (as old John of Gaunt hath it) and by the Royal Navy. Old John of Gaunt, or rather Master William Shakespeare, was thinking of invasion by land troops from over the sea, and not of bombs dropped from the skies. Invasion is still a possibility which must not be overlooked, and in the Great War it received a good deal of attention, and kept at home some troops which were badly needed on the various war fronts.

It may sound like a paradox, but Rear-Admiral H. G. Thursfield, writing in the latest issue of *Brassey's Naval Annual*, puts forward the view that the invention of aircraft has actually increased the safety of this country from invasion. This conclusion has been reached by studying the results of the combined coast defence exercises held last year. The shore-based aircraft did excellent work in locating the approaching fleets of the supposed enemy, and so destroyed all chance of a surprise landing being made. Certainly, the exercises were held in the summer months, and even so there were days when the aircraft were kept on the ground by the weather, and it has to be admitted that air reconnaissance has its limitations; but nevertheless the Rear-Admiral is justified in his conclusion that the advent of air forces makes real invasion more difficult than ever.

## Years of Discretion

THIRTY years of aircraft construction take one back to what the French so aptly term the "heroic" days of flying. They *were* heroic, except that the early experimenters did not feel a bit like heroes, for the very simple reason that they did not realise the risks they were running. Stress calculation was a matter of simple trigonometry, and such things as redundant structures which were "statically indeterminate" never troubled the early designers very much, and there was no Farnborough to tell them how to calculate stresses by the "principle of least work." And on the whole, there were few cases of things breaking in the air.

Mr. Frederick Handley Page, the history of whose firm is told in this issue, was one of the earliest British aircraft designers and constructors. At one time he also threatened to become a pilot, but Mr. Pemberton Billing won a bet by getting his "ticket" in one day at Brooklands, the while "H. P." got no farther than circuits at Hendon, and after that he decided that piloting wasn't really so amusing, and stuck to the technical and financial sides.

It is a far cry from the small sheds at Barking to the huge works at Cricklewood and Radlett; from the dozen or so men employed in 1909 to the—(no, we must not mention how many there are at Cricklewood, but 5,000 of them went down to Portsmouth last Saturday in eight trains). But "H. P." himself has changed but little during those thirty years, in spite of a bank balance which must by now be very comfortably on the plus side of the ledger, whereas in the early days it was often enough perilously close to being on the minus side. Through all vicissitudes "H. P." has kept his good humour and his hard common sense. He has achieved success, and he has deserved it.

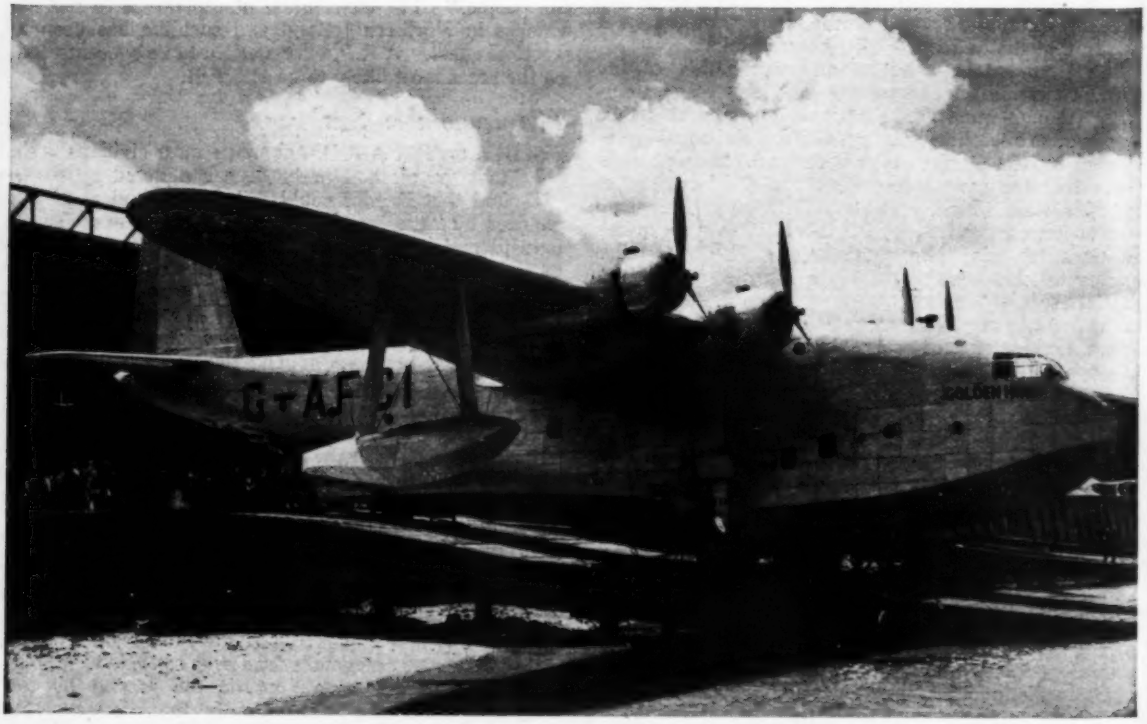
## The Midlands and North

IT is comforting to be assured by those who ought to know that the output of aeroplanes for the R.A.F. is now very satisfactory. The output of pilots and aircraftmen is also very good, and the quality of the output in both cases is, we know, deserving of superlatives. Surely the time has now come for us to hear of the formation of new squadrons for the R.A.F.

The *Air Force List* now gives a minimum of information, but it does give the numbers of existing squadrons, and, of course, those numbers are carefully noted by foreign information departments. Those keen observers will not have failed to make a note of the fact that since January last only one squadron, a Manchester unit of the Auxiliary Air Force, has been added to the list. That suggests a huge piling up of reserve machines, but we are tempted to wonder where all the new personnel are going. There have been some transfers to the Fleet Air Arm, but not enough to counterbalance the ever-growing list of recruits to the R.A.F., which are reported week by week.

We suggest that the time has now come for a considerable increase in the strength of No. 12 (Fighter) Group, which is responsible for the defence of the Midlands and North. London may be the chief target that an enemy would attack, and it is right that it should be very strongly defended; but there are great concentrations of factories in the cities of the Midlands and North, and the length of coastline which No. 12 Group has to watch is considerable. The speed of modern bombers discounts much of the mobility of our fighters. We need patrols near every threatened point, for the warning of a raid will not give much margin of time for reinforcing.

DIARY OF FORTHCOMING EVENTS—Page 638.



**SHORT'S LATEST: The *Golden Hind* was launched at Rochester last Saturday. This 32-ton craft, the first of the "G" class, will be used for mail carrying only, and will have a range of more than 3,000 miles. The most noticeable difference from the Empire boats, apart from size, lies in the shape of the rear step. Four Bristol Hercules provide the power.**

# DERBY'S AIRPORT OPENED

## *Sir Kingsley Wood Gives Another Aerodrome Its Send-off : F.A.A. Skua Squadron Seen in Action in Public for the First Time*

*"Flight" photographs.*

**Perfection in formation—one of the magnificent figures by the twelve Spitfires which opened the R.A.F. section of the programme. On the right the Air Minister is seen declaring the airport well and truly open.**

HARDENED, blasé or ill-mannered people concerned with the business of aviation might have previously dismissed last Saturday's event as "just another airport opening." Derby is not—during the next few years at any rate—likely to be an important airline centre, its aerodrome is not exceptionally big, the buildings are not yet complete, and there are, so far, neither lighting nor wireless facilities. For some time, in fact, the aerodrome at Burnaston is likely to be of interest largely as an Elementary and Reserve (and Volunteer Reserve) centre.

But everybody who visited the town last week-end was made to feel that this new venture was one of the most important developments in its history. Both the airport opening ceremony and the official banquet at the Rolls-Royce factory which preceded it were tremendous affairs—thanks to local enthusiasm and energetic organisation. Mr. William Courtenay, who was responsible for the latter, must be given full marks for the way in which the whole thing went off and for the amount of first-class display support which was forthcoming.

The flying on Saturday afternoon was among the most superb, well-timed and varied which we have ever seen at an event of this description. The key piece was the show put up by a Fleet Air Arm squadron with Blackburn Skuas—it was the first occasion on which the Arm had taken part in a display of this kind. And it started as spectacularly as anyone could wish. Nine Skuas, peeling off at 2,000 feet or so (the cloud base was on the low side), dive-bombed the official enclosure, completing the pull-out at 200 feet or less.

As each machine took up its nearly vertical attitude, hanging momentarily on sky-hooks, the official public obtained some idea of the feelings of the dive-bombed, while the more knowledgeable realised just what the Skua's flaps will do. Without them, from that height and with such impressively clean machines the pull-out would have been started almost as soon as the dive had begun; with them the speed is limited to something rather more than 200 m.p.h.

Their effect was also seen at least once during the succeeding ten minutes, in which the squadron broke up into flights and, with split-second timing, made converging front-gun attacks on the assembled dignitaries. Evidently the flaps were being used to control the speeds and, consequently, the distances both between the individual machines and the flights, which attacked from three points of the compass in rotation. The effect of flaps became very obvious when a Skua with flaps down was promptly overtaken after the pull-up by the third machine in the flight, which had its flaps up. A most impressive affair.

Thereafter, a flight of Skuas landed while the other six showed that the squadron's formation flying was well-nigh perfect. The three remaining machines were due to give an exhibition of deck landing—complete with a carrier's "island" superstructure made up on one of the Corporation's mobile overhead-wire repairing towers. With this foundation the "island" was usefully mobile, and carried its control staff without risk of minor disaster. On the sides of this tower were four of the white cross-on-red signal boards, one of which is normally used to indicate all-clear, or otherwise, to the approaching pilot, and at the leeward end of the "deck" was

"Flight" photograph.

**H.M.S. *Burnaston* receives a Skua : the educative deck-landing demonstration given at Derby.**

the control officer with his signalling "bats."

For the sake of demonstration, one of the pilots made his approach with undercarriage retracted, so that the deck control officer had a chance of showing how the last-second "do not land" signals are made, while the main signal boards were removed from time to time, so informing the next pilot that the "deck" was not clear for his landing. Altogether, a most educative ten minutes for the mere land pilot and others—and a demonstration of near-perfect spot landings. There was very little natural wind and none of the artificial variety.

## *Formation Perfection*

At the risk of spoiling the effect by the use of too many superlatives, it must still be said that the twelve Supermarine Spitfire pilots, who opened the R.A.F. section of the display, put up an almost unbelievably accurate formation flying show. The lines could not have been straighter and the distances more even if they had been drawn and measured in the sky. Unfortunately, we are not able, nowadays, to give a squadron's number or home station. This one really does deserve to be excepted from the Air Ministry rule. Whether the pilots were flying in Tee-formation, in a Vic of squares, a square of Vics, in a line ahead of Vics or in an echelon of Vics, the effect was aesthetically perfect.

The low-bombing formations of the Fairey Battles and the supply-dropping show of the Westland Lysanders probably did not receive their due amount of attention and praise after the Skuas and the Spitfires. The crowd, in fact, had to wait for an individual display by Flt. Lt. R. C. Reynell, one of the Hawker test team, with a special Hurricane, before being raised to the same heights of excitement. This Hurricane, in white with civil registration, has a c.p. or c.s. airscrew and may be described as the demonstrator successor to the old Super Fury.

From the moment of take-off it could be seen that this Hurricane was different. Flt. Lt. Reynell opened with a long power dive ending in more successive upward rolls than we had believed possible and a half-loop, from which the Hurricane was aileron-turned in a vertical dive. As he pulled out a "condensation" plume from the port wingtip could be distinctly seen, and it certainly added to the effect. Not so spectacular, but more essentially effective were his absolutely vertical high-speed turns round the inside of the aerodrome boundary. We have definitely never seen one of these modern fighters flick-rolled before—or flown inverted at such a low altitude. Curiously enough, the Merlin continued to function in this attitude, and only cut properly when Flt. Lt. Reynell rolled the Hurricane very deliberately back to normal.

In the meantime, several of the more modern Service types had been individually demonstrated, including a normal short-nosed Bristol Blenheim, a Handley Page Hampden, an Armstrong Whitworth Whitley, another Hurricane (this time with Service markings) and a Vickers Wellington, the crew of which had won the sealed-time arrival competition.

Three barrage balloons were afterwards allowed to "fly" and the speed at which they were both released and, later, hauled in by winches was quite impressive. Unfortunately, the wind, in the intervals of sunshine and storm, was extremely changeable and fitful so that for most of the period of demonstration all three balloons were pointing in various directions and the stabiliser bags hung more or less limply. The show was put on by No. 1 Balloon Training Unit.

For some temporarily unknown reason, the Gloster Gauntlet, which was to be used for an individual aerobatic display, was not flown.

## *The Civil Show*

Of the civil machines there was a very fair demonstration selection—and, unusually enough, there were not too many to bore the multitude. Right at the beginning of the afternoon, immediately after the airport had been opened, three Taylorcraft arrived from Leicester, the leader with a coloured streamer attached to it's tail-wheel, and this particular machine was flung somewhat frighteningly about the sky at low altitude. The pilot—presumably Mr. Wynne-Eyton, the Taylorcraft test pilot—certainly showed that this aeroplane will do all the normal aerobatics without undue loss of height. Most spectacular were his sudden turns which, with the slipstream, gave the streamer something to think about.

After the Service displays Mr. Alex Henshaw flew his special Mew Gull in his usually smooth style with upward rolls to choice, and Mr. D. M. Bay took a Percival Vega Gull around the sky rather more gently, as befitted a four-seater cabin machine. As at the R.Ae.S. Garden Party, three Tipsys, flown by Mr. Brian Allen, Mr. E. D. Ward and Sqn. Ldr. E. F. Mole, played follow-my-leader round the aerodrome boundary, but this time there were no aerobatics in the general sense. Needless to say, Mr. R. A. C. Brie showed the new C.40 jump-start Autogiro to perfection, while the action was fairly well simplified by the commentator—Mr. Castlemaine, who had taken over from Mr. Courtenay for the civil types.

At or about this time quite a number of things were happening at once, and in adequately describing the virtues of the tricycle Cygnet, which was being "driven" by Mr. Hollis-Williams, the commentator rather forgot Mr. H. W. C. Skinner, who was doing some very nice aerobatic flying in his Miles Magister, and Mr. Phillip Brown, who had been loosed-off from a Moth Major at 3,000 ft. in a Minimoa sailplane. This was looped steadily on its way earthwards and was finally put down very accurately and finished its run almost directly in front of the official enclosure. The afternoon officially terminated with parachute drops by Miss Clark and Mr. De Greeuw with 28ft. and 24ft. G.Q. parachutes respectively.

## *The Banquet*

At the previous evening's banquet the Mayor of Derby, Alderman D. S. Butler, was in the chair, and the principal guests were Sir Kingsley Wood and Rear Admiral R. Bell Davies, V.C., the newly appointed Rear Admiral, Naval Air Stations. There were no fewer than nine speeches at this function, and it is not possible to do more than pick out some of the more salient and interesting statements made by some of the speakers.

Sir Kingsley, replying to the toast of the Royal Air Force and Fleet Air Arm, emphasised once again that our rearmament was intended not to make war but to preserve peace. He also said that those men who come up for training under the new Act were permitted, if they so desired, to join the Volunteer Reserve, in which they would have the same status as those who had already joined. Rear Admiral R. Bell Davies, who also replied to this toast, gave a brief and interesting history of the Fleet Air Arm and explained why this Arm had finally come under the separate charge of the Admiralty.

After recounting the long connection between Derby and Rolls-Royce, Lord Herbert Scott, the Chairman of the Company, proposing the toast of Civil Aviation, also referred to the new Crewe factory and to that near Glasgow which would be managed by them. He also announced that his firm had given the new Derby Aero Club the sum of a hundred guineas. In his response to this toast, Ald. W. R. Raynes explained how the Council had first considered the idea of an aerodrome as long as ten years ago. He then went on to describe its features.

# ATLANTIC ANNIVERSARY

*Twenty Years Ago : How Alcock and Brown, in a Vickers Vimy, Made the First Direct Atlantic Crossing*

Capt. Alcock (centre) and Lt. Whitten Brown (right) photographed at the Royal Aero Club after their great flight. On the left is H. G. Hawker, who had been rescued from the Atlantic.

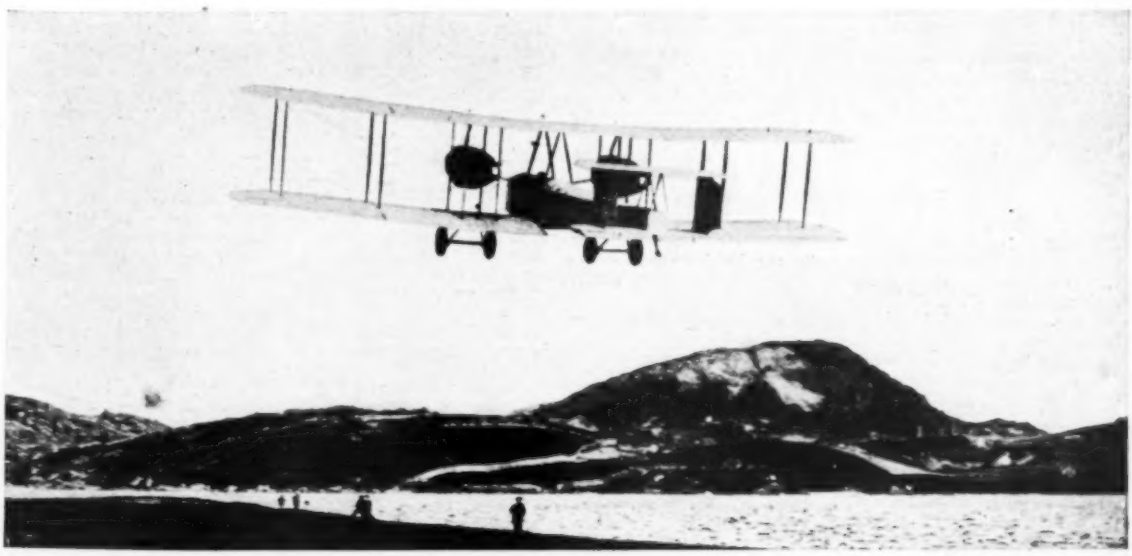
TWENTY years ago, at 8.40 a.m. on June 15, 1919, a Vickers Vimy landed at Clifden, Ireland, after making the first direct air crossing of the Atlantic. The pilot was the late Capt. J. Alcock, D.S.C., and the navigator Lt. Whitten Brown. Less than a week later they were knighted. A fortnight earlier, three flying boats of the U.S. Navy had made a crossing via the Azores, while the late H. G. Hawker and Cdr. Mackenzie-Grieve, attempting a direct crossing in a Sopwith landplane, had been forced down in the sea and posted as missing—actually they had been picked up by a ship without wireless.

The Vimy had left St. Johns, Newfoundland, at 4.13 p.m. (G.M.T.) on the previous day, and the crossing of 1,880 miles to Clifden, where the machine was put down in what appeared to be a nice meadow and which turned out to be a bog, was made in a time of 16 hr. 12 min. Considering that the Vimy was cruised during the crossing at about 90 m.p.h., this was a remarkably good time and suggests a following wind of about 25 m.p.h.

Apart from the following wind, however, Alcock and Brown had a fairly uncomfortable sixteen hours and suffered everything from low cloud and fog to that modern discovery, ice formation. During the greater part of the flight, nevertheless, the machine was flown at an average altitude of about 4,000 ft., and early in the morning, at about 6 a.m., Capt. Alcock climbed up to 11,000 ft. in order to enable Lt. Whitten Brown to obtain some sextant sights.

This use of the sextant is to-day one of the most interesting features of the crossing. Only in the last year or two have transport and bomber crews made any real attempt to use marine methods of position finding. During the flight the navigator was able to take three sights, one on the sun, one on the moon, and one on the Pole Star and Vega. On leaving Newfoundland, he set a course of 124 deg. M. and at 3 a.m., after an observation of Polaris and Vega, he found that the machine was about 2 deg. south of its correct track. The course was then reset at 110 deg. M. In fact, conditions for such methods of navigation were far from good, and after the first forty minutes' flying they only saw the sky for about an hour.

It is not generally known that the Vimy carried wireless, though this was not used, because about an hour after setting out the generator fan-shaft sheared and the equipment



The Vickers Vimy taking-off from Newfoundland on the attempt. The engines were two Rolls-Royce Eagles of 375 h.p.

was without power. In any case direction-finding wireless had not reached the state of development which would enable it to be used over the necessarily extremely long distances, but Whitten Brown had previously decided to use marine methods and to obtain fixes for himself with the aid of a sextant and a bubble level. In spite of the very difficult conditions, the use of a sextant proved to be practicable, since even if only one or two positions could be fixed satisfactorily, they were quite enough.

Needless to say, the machine carried no blind-flying equipment as we know it. For the first period of the flight it was flown above the Newfoundland fog bank and below a cloud base which eventually became 10/10ths. Between 4 and 5 a.m. they flew into a very thick ice-forming fog bank, and the first thing that happened was that the pitot head closed up with the air-speed indicator needle showing 90 m.p.h. At that time the Vimy was flying at about 4,000 ft. and apparently shortly afterwards went into either a spin or, more likely, a stalled spiral. Luckily the sea became visible in time to give Alcock a chance of straightening things out before actually touching the water. The Vimy, in the meantime, had covered itself with ice. The last part of the flight was made at a height of about 200 ft.

### *Short Take-off*

By way of comparison with modern ideas in take-off runs, it is interesting to know that the improvised aerodrome was only 500 yards in length and the heavily loaded Vimy took 300 yards of this distance, though the wind was slightly across the take-off run, clearing the trees and houses by no very great margin. Nevertheless, height was gained with reasonable rapidity, though there were some unpleasant moments while flying down an extremely bumpy valley.

After the Vimy had been put down and the Royal Aero Club observer, Major R. H. Mayo, had come over from Dublin in an aeroplane and a car to make an official examination of the machine, Alcock and Brown dismantled the instruments and set off for London. They were given a civic reception at Galway and in Dublin, crossing over by boat to Holyhead, whence their progress to London was largely a repetition of the proceedings on the occasion of the late Mr. Hawker's return a few weeks previously. All manner of notabilities met the crew of the Vimy at Euston, whence a car took them to the Royal Aero Club to be welcomed by Gen. Groves, the chairman.

The late Capt. Alcock or, as he became a week later, Sir John Alcock, D.S.C., learned to fly at Brooklands in 1912 on a Farman biplane and secured third place in the London-Manchester race of 1914. When war broke out he joined the R.N.A.S., acting as an instructor at Eastchurch, and eventually went out to the Eastern Mediterranean, where he was captured by the Turks after a forced landing. At the time of the flight he was engaged by Vickers, and afterwards remained as their test and experimental pilot.

Lt. Whitten Brown (now Sir Arthur Whitten Brown) was, first and foremost, a navigator. Before the war he was an engineer by profession and received his practical training at the British Westinghouse Company, which was later allied to the Vickers group, and became interested in flying as applied to survey work. He served in France in 1915 with the Manchester Regiment, and later transferred to the R.F.C. as an observer, was wounded and taken prisoner. After repatriation in 1917 he spent some time instructing and was later engaged in the engine section of the aircraft production department.

The Vickers Vimy used for the crossing was a twin-engined biplane bomber which first appeared in 1918 and from which one of the earliest genuine commercial machines—the Vimy commercial—was developed, with two Rolls-Royce Eagle engines of 375 h.p. In Service form the Vimy carried a pilot and two gunners, one in the nose and the other just aft of the trailing edge, and it had something like a tricycle undercarriage—in other words, a nose wheel or, alternatively, a skid to prevent the machine from turning over on heavy ground. The normal loaded weight of the machine was 12,500 lb., which included 450 gallons of fuel. The machine is now in the Science Museum, South Kensington.

**Another view of the Vimy during the take-off from Newfoundland.**

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### *Britain at Brussels*

AT the Brussels Aero Show, which begins on July 8 and remains open until July 23, there will be no fewer than 23 British exhibitors. Collectively, the British contribution will cover some 3,400 sq. metres of floor space—very nearly a third of the total.

The list of exhibitors, according to the S.B.A.C., is as follows :—

Accles and Pollock, Ltd.
Airspeed (1934), Ltd.
Alvis, Ltd.
Automotive Products Co., Ltd.
Blackburn Aircraft, Ltd.
Bristol Aeroplane Co., Ltd.
Cellon, Ltd.
De Havilland Aircraft Co., Ltd.
Dunlop Rubber Co., Ltd.
Gallay, Ltd.
General Aircraft, Ltd.
Hawker-Siddeley Aircraft Co., Ltd.
High Duty Alloys, Ltd.
Jablo, Ltd.
D. Napier and Son, Ltd.
Phillips and Powis Aircraft, Ltd.
Reid and Sigrist, Ltd.
Rolls-Royce, Ltd.
Rotax, Ltd.
W. S. Shackleton, Ltd.
Short and Mason, Ltd.
Smith's Aircraft Instruments.
Society of British Aircraft Constructors.
Vokes, Ltd.

It is also probable that there will be an official Air Ministry exhibit.

### *Big Effort for Civil Aviation Benevolent Fund*

A FORTNIGHT ago we indicated that a big effort, commencing with a flying display, was to be made to swell the G.A.P.A.N. Benevolent Fund. It is now announced that it is hoped to hold the display at Redhill Aerodrome on July 29.

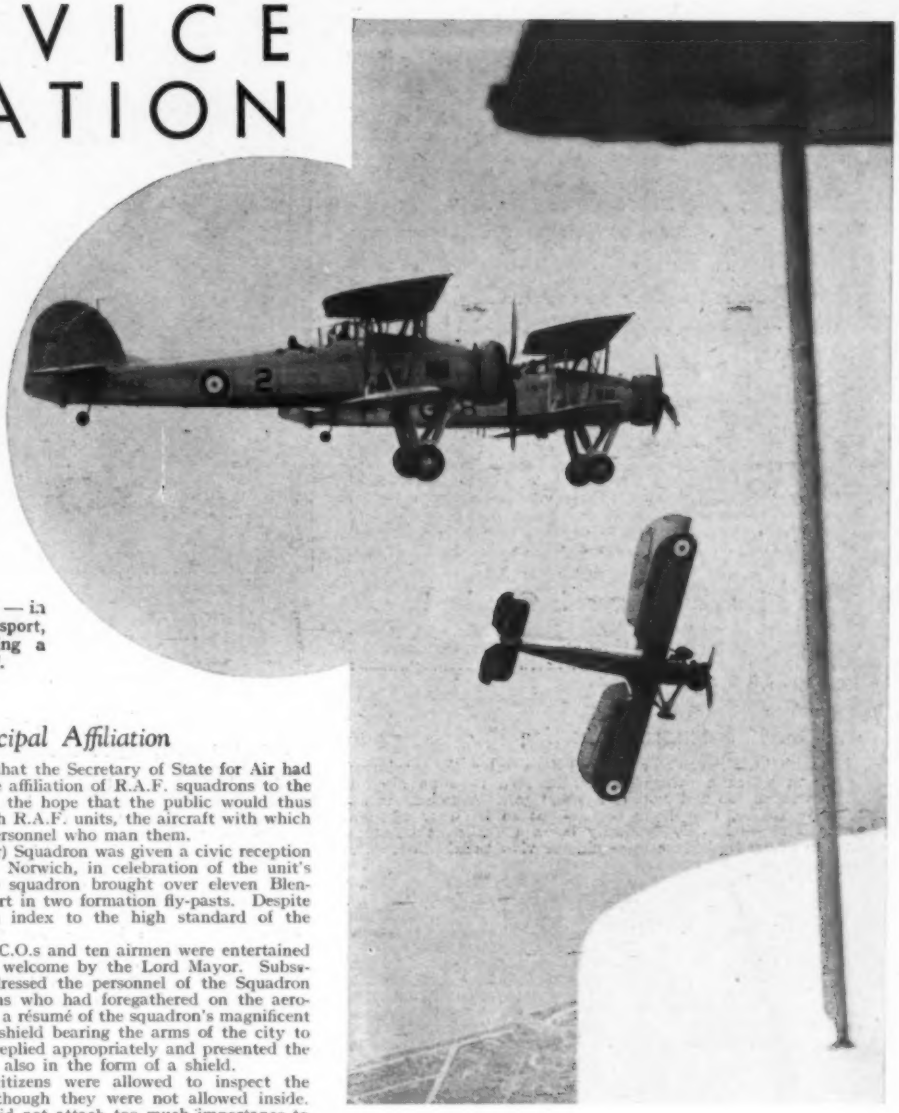
The organisers are hoping to increase the Fund to around £100,000, and to make it available, under the title of the Civil Aviation Benevolent Fund, to the dependents of all pilots and crews earning their living by flying, irrespective of any organisation to which they may belong.

In connection with this "drive" for funds a souvenir book is being produced, to which various well-known personalities are contributing articles on various aspects of aviation. In it will be included a list of donors to the Fund up to the time of going to press, which will be in the early part of next month. Five hundred names, it is stated, have already been enrolled. The book will be on sale to the public at 2s. 6d.

The hon. organiser is Mr. F. W. Farey-Jones, F.R.S.A., Room 172, Airport of London, Croydon. Cheques should be made payable to the G.A.P.A.N. Benevolent Fund and crossed "A/c Payee Only." It is hoped that the aircraft industry, in particular, will generously support this worthy cause.

# SERVICE AVIATION

*Royal Air Force and Official Announcements : Fleet Air Arm News : Military Aviation Abroad*



**DOWN TO THE SEA — in Swordfish T.S.R.s from Gosport, which are seen practising a dive-bombing peel-off.**

## A Municipal Affiliation

IN April it was announced that the Secretary of State for Air had approved a scheme for the affiliation of R.A.F. squadrons to the principal cities and towns in the hope that the public would thus become better acquainted with R.A.F. units, the aircraft with which they are equipped and the personnel who man them.

A week ago No. 21 (Bomber) Squadron was given a civic reception at the Municipal Aerodrome, Norwich, in celebration of the unit's affiliation to that city. The squadron brought over eleven Blenheims, nine of which took part in two formation fly-pasts. Despite the gusts these provided an index to the high standard of the squadron's work.

Fourteen officers, twelve N.C.O.s and ten airmen were entertained to lunch prior to the official welcome by the Lord Mayor. Subsequently the Lord Mayor addressed the personnel of the Squadron and some hundreds of citizens who had foregathered on the aerodrome. The Lord Mayor gave a résumé of the squadron's magnificent war history and presented a shield bearing the arms of the city to Sqn. Ldr. L. T. Keens, who replied appropriately and presented the city with the squadron crest, also in the form of a shield.

For a few minutes the citizens were allowed to inspect the machines at close quarters, though they were not allowed inside. It is to be hoped that they did not attach too much importance to the announcer's own specification of the standard Blenheim, which included a crew of five and a range of 3,000 miles.

The ceremony was attended by Air Comdre. J. C. Quinnell, D.F.C. (Air Officer Commanding No. 6 Group), Group Capt. F. J. Vincent and Wing Cdr. F. R. D. Swain.

A photograph appears on the next page.

## Commonwealth Production

ACCORDING to a report from Australia, the Commonwealth Aircraft Corporation, Ltd., of Fishermen's Bend, near Melbourne, will not continue with the production of complete aircraft after the present order for Wirraways has been completed. The company will, it is stated, concentrate upon the production of aero engines, probably of the Bristol Taurus type for installation in the Beaufort general-purpose twin-engined monoplanes, which will be assembled at plants at Sydney and Melbourne.

## R.A.F.V.R.—Meteorological Section

A METEOROLOGICAL Section of the Royal Air Force Volunteer Reserve is being formed in the London area. This will include both officers and airmen and will provide an opportunity for men with scientific training or others who are interested in weather forecasting and its application to the defence services to gain knowledge which would be of great value to the nation in time of emergency.

Candidates for commissions should have taken a university degree in physics, mathematics, geography or cognate subjects or be senior undergraduates studying for honours degrees in these subjects. It is hoped that university and college lecturers, secondary schoolmasters, post-graduate students and research workers will apply.

Volunteers for the non-commissioned ranks will be recruited from the large number of young men who are interested in meteorology but who have had no specific training in science beyond the school certificate standard.

As with the other sections of the Royal Air Force Volunteer Reserve, members of the Meteorological Section will be required to undergo systematic training to fit them for the specialised work they will have to perform. This training will be given by members of the Meteorological Office Staff of the Air Ministry. Recruiting is, for the present, limited to candidates who can conveniently undergo evening instruction in London.

Members will be required to attend for instruction on one or two evenings a week and an occasional Saturday afternoon until they have reached a certain degree of efficiency. In addition, they will attend for a continuous period of 12 days' training each year at a Royal Air Force Station. Officers will be given instruction in modern methods of forecasting and in the physical principles on which forecasting is based. Airmen will be trained in the technique of supplying forecasters with coded details, obtained by direct observation and from instrumental records, of all the main weather elements. They will be taught to determine the height and speed of clouds, the speed and direction of the upper winds by means of pilot balloons, and to plot weather charts. As with other branches of the Volunteer Reserve, members of the Meteorological Section will be under an obligation to serve immediately with the Royal Air Force at home or abroad in the event of a national emergency.

Training allowances of 1s. an hour for officers and 6d. an hour for other ranks will be paid in respect of evening instruction. During the period of continuous training at a Royal Air Force Station the rates of pay and allowances will be those appropriate to the ranks and trade group of the personnel. Travelling expenses incurred in respect of authorised attendance for training will be refunded

## Service Aviation

Officers will receive a retaining fee of £15 at the end of each year of service when they have been confirmed in their appointments and have reached the prescribed standard of proficiency. An outfit grant of £25 will be made to cover the purchase of the necessary articles of uniform.

Airmen will be paid a bonus of £5 on satisfactory completion of each year's service, and will receive a free issue of uniform.

Applications should be addressed to the Assistant Commandant, R.A.F.V.R., Meteorological Section (M.O.10), Victory House, Kingsway, London, W.C.2.

## Royal Air Force Garden Party

THE organisers of the Royal Air Force Garden Party announce that as it is felt that it would be the wish of the late Sir Philip Sassoon that the Party, which had been arranged for Saturday, June 24, at Trent Park, Cockfosters, should still be held, Sir Philip's family have requested that the original arrangements should stand.

The date for the receipt of applications for tickets at the price of 5s. has been extended to to-day, June 22, after which the price will be 7s. 6d. Applications with remittances should be addressed to the Secretary, Royal Air Force Officers' Garden Party, Air Ministry, Adastral House, Kingsway, London, W.C.2.

All officers, past and present, of the Royal Air Force, the Auxiliary Air Force and the Royal Air Force Reserves and Women's Royal Air Force are invited, also their wives, and sons and daughters over 16 years of age, members of Princess Mary's Royal Air Force Nursing Service and officers of the Royal Air Force Companies of the Auxiliary Territorial Service. The invitation is also extended to civilians of officer status employed under the Air Ministry throughout the country, and widows of officers formerly connected with the Service. Guest tickets are available.

## Two Hundred Harvards Completed

THE first batch of 200 North American Harvard advanced trainers (Pratt and Whitney Wasp) has now been completed, and the company is hard at work on the second batch of a similar number of these noisy, but useful, aircraft.

## Submarine Spotting

GIVEN sunlight, absence of wind, and deep water, the maximum depth at which a submarine can be seen from an aircraft operating between 300 and 2,000ft. is about 50ft. According to an authoritative source, this depth corresponds to the case when a submarine is approximately vertically below the aircraft (sighting angle up to 20 deg.). With a more oblique view the depth rapidly diminishes, being about 16ft. at 60 deg.

Should the submarine be on the surface when spotted and then dive it is possible to calculate the "conical surface" on which it must be situated, provided its rate of submergence and speed attainable under water is known. It is further stated that if, at the same time, the distance of the aircraft from the submarine when submersion started is known, the dimension of the circular locus on the immersion cone when the aircraft passes the original position can be determined and the bomb dropping adjusted accordingly. As an alternative the aircraft can describe a curve round the submarine so as to maintain a constant sighting angle, summoning other aircraft or surface vessels in the neighbourhood to participate in the hunt

"Flight" photograph

**AFFILIATION: Sqn. Ldr. L. T. Keens, O.C. No. 21 (Bomber) Squadron receiving from the Lord Mayor of Norwich a shield bearing the arms of the city. A note on the ceremony appears on the previous page.**

## Flying Accidents

THE Air Ministry regrets to announce the following flying accidents:—

L.A/C. William Brian Cook and George William James Mills lost their lives, and P/O. Allan Henry Barnes (second pilot) and A/C. 1 Gordon Hallam Leighton are missing and believed to have lost their lives as the result of an accident which occurred in the Johore Straits on June 5 to an aircraft of No. 230 Squadron.

The first pilot of the aircraft, F/O. (acting Flt. Lt.) William Wier Campbell, and the following members of the crew were slightly injured: Cpl. Stanley Hugh Williams; L. A/C. John Joseph Alfred Smith; A/C. 1 James Colville.

P/O. Alner George Newton, Sgt. George Harold Fawcett and A/C. 1 Robert Glynn Thomas lost their lives in an accident which occurred in Fifeshire, on June 6, to an aircraft of No. 61 Squadron.

Sgt. Gordon Allan Hughes died in Woolwich Hospital on June 7 as the result of injuries received in an accident which occurred in Essex.

Midshipman (A) James Vincent Reed (flying solo) lost his life in an accident which occurred near Salisbury, Wiltshire, on June 15, to an aircraft of No. 1 Flying Training School.

## Royal Air Force Gazette

*Air Ministry, June 16*
*General Duties Branch*

J. A. G. Gordon is granted a permanent commission as Pilot Officer with effect from July 22, 1936, and with seniority of October 22, 1934, and is promoted to the rank of Flying Officer with effect from January 22, 1937, and with seniority of April 22, 1936, and to Flight Lieutenant with effect from January 22, and with seniority of April 22, 1938. (Substituted for notifications in *Gazettes* of August 18, 1936, July 27, 1937, and March 14 respectively.)

The following (from Reserve) are granted a short-service commission for six years on the active list as Pilot Officers on probation on the dates stated:—A. T. N. Scoltock (May 31); R. T. L. Buttery (June 1).

The following are granted short-service commissions as Acting Pilot Officers on probation (May 27):—D. H. K. Alwood, J. V. Baldwick, D. C. Barker, J. W. Blennerhassett, B. S. Booth, P. D. W. Brierley, D. D. M. Butcher, F. B. Burningham, E. F. K. Campling, C. W. W. Darwin, E. J. Durston, J. H. Edwards, K. R. Gillman, F. W. Gilmore, J. H. Godwin, A. H. N. Gooch, F. M. Goyen, R. R. Green, P. S. Handley, A. Harte-Lovelace, J. E. S. Hill, R. James, D. T. Jay, R. A. Kirkwood, A. Leeson, G. J. Lynes, G. E. Macdonald, E. A. McLundie, H. N. Masterson, R. A. Marchand, J. L. Moore, I. A. Morrin, M. R. Mudie, G. W. Nicholson, V. J. Norman, R. T. Pareezer, H. G. R. Pirie, H. K. Ralph, R. Rustom, T. D. Saul, W. C. Scott, T. B. A. Sherrington, B. Y. Sowter, A. J. Strachan, R. I. Sworder, F. B. Weir, D. R. West, R. J. S. Wootton.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. D. S. Huxley, D. C. Yorke (Acting Flight Lieutenant) (seniority January 19) (April 19); D. C. Curme (Captain, Royal Artillery) (Honorary Flight Lieutenant), J. K. M. K. Drysdale (Captain, The Royal Scots) (Honorary Flight Lieutenant) (seniority May 18, 1938) (May 18); J. F. Maffett (Lieutenant, The Duke of Wellington's Regiment) (seniority May 19, 1938) (May 19); M. M. Kane (Acting Flight Lieutenant (May 19); S. S. Fielden (Captain, Royal Artillery) (Honorary Flight Lieutenant) (seniority May 24, 1938) (May 24).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—W. M. Bisdee (seniority December 21, 1937) (September 28, 1938); J. J. Bennett (April 6); J. C. Whittall, N. E. W. Pepper, I. F. McCall (Acting Flight Lieutenant), R. H. Dingle (May 12); R. L. C. Branson (May 16); T. H. T. Forshaw (May 17, 1939).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—M. F. C. Farrar (March 2); R. G. Hurst (April 3); T. J. Hanlon (April 24); L. D. Wilson (April 25); J. Butterworth, P. Hadfield, D. W. Burt, J. S. Laird (May 8); R. N. Wardell, G. R. Boles, I. P. Grant (May 15); F. R. McAllister (May 22); R. S. Blake (May 24); W. E. Mulford (June 1).

F/O. K. R. Rogers is granted the acting rank of Flight Lieutenant (April 3) (substituted for notification in *Gazette* of May 23); P/O. P. G. St. G. O'Brian is granted the acting rank of Flight Lieutenant (May 8).

The following Flying Officers relinquish the acting rank of Flight Lieutenant on the dates stated:—T. S. R. King, I. A. Mead (May 14); T. F. D. Morgan (May 15).

P/O. H. St. G. Turner relinquishes the acting rank of Flight Lieutenant (March 10); Sqn. Ldr. A. P. C. Hannay, M.C., Major, The Queen's Own Cameron Highlanders, ceases to be seconded to the Royal Air Force on return to Army duty (April 24); Sqn. Ldr. R. C. Jonas is placed on the half-pay list, Scale B (March 31, 1938) (one day); F/O. V. N. Clifton takes rank and precedence as if his appointment as Flying Officer bore date May 24, 1938. Reduction

to take effect from April 21; F/O. D. I. Jobson takes rank and precedence as if his appointment as Flying Officer bore date April 26. Reduction to take effect from April 26; F/O. N. O. Lash (Supplementary List) resigns his short-service commission (May 4); F/O. P. D. D. Carlton resigns his short-service commission (June 10).

*Medical Branch*

Flt. Lt. G. A. M. Knight, M.B., B.S., D.L.O., is promoted to the rank of Squadron Leader (April 27); Flt. Lt. R. N. Kinnison, M.B., Ch.B., is placed on the retired list on account of ill-health (June 2).

## Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS

*General Duties Branch*

The following are granted commissions in Class CC in the ranks and on the dates stated:—

*Squadron Leader.*—Sqn. Ldr. E. W. Simpson (R.A.F.O.) (March 9. *Flight Lieutenants.*—Capt. A. N. Greg (October 4, 1938); Lt. J. C. Williamson, Sec. Lt. C. A. Wright (May 1); Lt. F. H. Bell (May 2). *Flying Officers.*—J. T. C. Hillman (March 21); R. D. Sampson (April 3).

Acting Pilot Officer on probation D. C. Nicholl is confirmed in his appointment and graded as Pilot Officer (May 16); Acting Pilot Officer on probation W. R. Burton is graded as Pilot Officer on probation, with effect from May 16, and confirmed in his appointment, with effect from May 19; Flt. Lt. W. R. Collins is granted the rank of Squadron Leader (March 29); F/O. B. W. E. Bonsey is transferred from Class A to Class C (October 11, 1938); Air Comdre. Sir Francis H. Humphreys, G.C.M.G., G.C.V.O., K.B.E., C.I.E., relinquishes his commission on completion of service (April 25); F/O. L. Malec relinquishes his commission on completion of service (March 12); F/O. J. J. Scholes relinquishes his commission on completion of service and is permitted to retain his rank (May 13); P/O. A. T. N. Scoltock relinquishes his commission on appointment to a short-service commission in the Royal Air Force (May 31); P/O. R. T. L. Buttery relinquishes his commission on appointment to a short-service commission in the Royal Air Force (June 1).

## Royal Air Force Volunteer Reserve

*General Duties Branch*

Sgt. G. W. Walenn is granted a commission as Pilot Officer on probation (March 29).

The following are appointed Honorary Flight Lieutenants on the dates stated—Lt. Col. C. F. Trench, D.S.O. (I.A., Ret.) (April 3); Lt. Col. B. de L. Brock, M.C. (I.A., Ret.) (April 20); Lt. Col. F. M. Matthews, M.V.O., C.B.E. (I.A., Ret.); Brig. L. M. Peet (I.A., Ret.) (April 24).

P/O. B. Heath relinquishes his commission on appointment to a commission in the Auxiliary Air Force (June 12).

*Equipment Branch*

A.P/O. E. A. Sadler is employed with the Royal Air Force, with effect from April 24.

*Medical Branch*

The following are granted commissions in the ranks stated (June 13):—Flt. Lts. J. R. Armstrong, M.D., B.Ch., F.R.C.S.; L. G. Scoular, M.D., Ch.B., D.O.M.S. F/Os P. S. Clouston, M.B., Ch.B.; G. R. Gunn, M.B., Ch.B.; J. V. Macgregor, M.B., B.S., M.R.C.S., L.R.C.P.

F/O. P. R. Tingley, M.B., Ch.B., resigns his commission (April 27).

## Auxiliary Air Force

*General Duties Branch*

No. 600 (CITY OF LONDON) SQUADRON.—F/O. D. de B. Clark is promoted to the rank of Flight Lieutenant (January 15).

No. 611 (WEST LANCASHIRE) SQUADRON.—B. Heath is granted a commission as Acting Pilot Officer (June 12).

No. 614 (COUNTY OF GLAMORGAN) SQUADRON.—The following are granted commissions as Acting Pilot Officers (April 15):—E. W. Latham, F. E. Clark.

No. 901 (COUNTY OF LONDON) SQUADRON.—Sir Michael W. S. Bruce-Bruce, Bt., is granted a commission as Flying Officer (April 22).

No. 905 (COUNTY OF SURREY) SQUADRON.—The following are granted commissions as Pilot Officers (May 19):—R. W. Holloway, H. L. Hutchinson.

No. 906 (COUNTY OF MIDDLESEX) SQUADRON.—B. May is granted a commission as Flying Officer (March 28).

No. 914 (COUNTY OF WARWICK) SQUADRON.—A. E. Jones is granted a commission as Acting Pilot Officer (April 20).

No. 916 (COUNTY OF WARWICK) SQUADRON.—Capt. J. J. Lloyd is granted a commission as Flight Lieutenant (March 5).

No. 919 (WEST LANCASHIRE) SQUADRON.—C. S. Hancox is granted a commission as Acting Pilot Officer (May 18).

No. 920 (WEST LANCASHIRE) SQUADRON.—The following are granted commissions as Acting Pilot Officers on the dates stated:—N. J. Smalithwaite (May 16); J. H. G. Pattinson (May 17).

No. 924 (EAST LANCASHIRE) SQUADRON.—J. H. D. Marshall is granted a commission as Acting Pilot Officer (May 17).

No. 927 (COUNTY OF GLOUCESTER) SQUADRON.—H. V. Jervis is granted a commission as Acting Pilot Officer (April 21).

No. 930 (HAMPSHIRE) SQUADRON.—G. P. Ritchie is granted a commission as Acting Pilot Officer (June 4).

No. 936 (COUNTY OF NORTHUMBERLAAND) SQUADRON.—The following are granted commissions as Pilot Officers on the dates stated:—W. R. S. Arkless (April 28); F. N. Stocker (April 30).

No. 937 (COUNTY OF NORTHUMBERLAND) SQUADRON.—J. N. Cone is granted a commission as Pilot Officer (April 28).

No. 938 (COUNTY OF NORTHUMBERLAND) SQUADRON.—S. Wilson is granted a commission as Pilot Officer (April 30).

No. 939 (WEST RIDING) SQUADRON.—S. D. Dickson is granted a commission as Pilot Officer (May 6).

No. 940 (WEST RIDING) SQUADRON.—A. H. Hastings is granted a commission as Pilot Officer (May 5).

*Accountant Branch*

No. 904 (COUNTY OF SURREY) SQUADRON.—I. H. Borland is granted a commission as Pilot Officer (May 11).

*Medical Branch*

No. 918 (COUNTY OF DERBY) SQUADRON.—J. D. Crerar, M.B., Ch.B., is granted a commission as Flying Officer (April 19).

No. 937 (COUNTY OF NORTHUMBERLAND) SQUADRON.—J. H. Pool, M.D., M.B., B.S., is granted a commission as Flying Officer (April 19).

No. 938 (COUNTY OF NORTHUMBERLAND) SQUADRON.—J. K. H. Scott, M.B., B.S., is granted a commission as Flying Officer (April 19).

*Chaplains Branch*

No. 612 (COUNTY OF ABERDEEN) SQUADRON.—Reverend J. R. Thomson is appointed Chaplain with the relative rank of Squadron Leader (May 9).

# FOREIGN SERVICE NEWS

## A Speed-model Dewoitine

IN the Dewoitine plant at Toulouse a high-speed monoplane known as the D.530 is nearing completion. This machine has been developed from the D.520 single-seater fighter, and, flown by Dewoitine's chief test pilot, Marcel Doret, will attack the world's landplane speed record, now held by a German Messerschmitt. It is uncertain what type of engine is being fitted, but it is likely to be either an Hispano-Suiza 12-4, giving 1,800 h.p. near the ground, or a special Rolls-Royce Merlin.

## Aerodrome Protection

THE Soviet publication *Air Fleet News* states that an aerodrome is always detected if the enemy can actually watch the take-off or landing of aircraft or if tracks can be seen in the dewy grass or on snow. For this reason aerodromes must be made to appear unsuitable by scattering light sand (giving the appearance of agricultural land) or simulating roads by burning away the grass in tracks. Artificial colouring can also be employed to advantage.

The attention of the enemy can further be diverted by erecting mock buildings at some distance from the aerodrome; these can be made of derelict aircraft, empty fuel tins or the like, and distinctive markings should be provided simulating landing instructions in the hope that the enemy will attack the "bait." The characteristic contours of aircraft standing in the open must be hidden by adding material of the same colour as the ground to wing tips and tail.

In winter unbroken snow is easily simulated by white ground sheets, and in summer the presence of abundant vegetation renders camouflage easier. In the absence of much vegetation, however, the difficulties are very great. Matters are complicated by the fact that when aircraft are coloured to render them more difficult to detect in the air this gives rise to increased contrast on the ground.

## Deck Landing "TB" Monoplane

THE first monoplane torpedo bomber to go into service as standard equipment on aircraft carriers is the U.S. Navy's Douglas TBD-1 low-wing two-seater with Pratt and Whitney Twin Wasp engine. In this design the torpedo is stowed internally, or, alternatively, a heavy bomb load can be carried and may be released in a dive, following standard U.S. Navy practice.

It might be guessed from the appearance of the machine that the top speed would be more than the 188 m.p.h. claimed by the manufacturers, particularly as it is little larger than the Douglas (Northrop) attack machines, which do considerably more than 200 m.p.h.

Additional data for the TBD-1 are: Cruising speed, 168 m.p.h.; landing speed, 63 m.p.h.; Service ceiling, 19,700ft.; range (at high speed), 404 miles; weight, empty, 5,036 lb.; gross weight, 8,677 lb.; span, 50ft.; length, 35ft.; height, 11ft. 3in.; fuel capacity, 96 U.S. gals.; airscrew diameter, 11ft.

## Lithuanian "G.P."

FOR some years the Lithuanian Air Force has been using a Pegasus-engined parasol monoplane for general purpose work. The latest version of this, according to information from the manufacturers, has a Bristol Pegasus XI or XXIII engine driving a three-bladed wooden fixed-pitch airscrew made in Lithuania. The machine known as the Anbo 41 takes off in 66 yards and lands in 165 yards. The climb to 4,375ft. takes 5 minutes.

The Anbo 41 is in production, together with the Anbo 51 trainer, in the Lithuanian Factory at Kaunas. Both machines were designed and built under the supervision of Gen. Gustaitis, one of the chiefs of the Lithuanian Air Force.

# FROM the CLUBS and SCHOOLS

## *Flying and Social Activities : C.A.G. Notes : News from Overseas*

**LONDON.**
THE flying time for last week amounted to 147 hr. Messrs. E. S. Powers, L. I. Loch, and W. G. James made their first solo flights. Miss B. Valdor and Mr. D. M. Campbell have joined as new members.

**STRATHTAY.**
Over 46 hr. flying time was recorded during the week ended June 11. Mr. T. E. Aird made his first solo flight.

**RENFREW.**
Over 42 hr. were recorded by members of the C.A.G. section last week, during which two members obtained their licences.

**ISLE OF WIGHT.**
The total flying time during the week ended June 11 was 116 hr. 40 min. Messrs. L. Bowhay-Saunders, C. Parker, P. H. Jay and R. K. Orrock have gone solo.

**WITNEY.**
Flying times for last week amounted to 66 hr. 50 min., in spite of two days during which no flying was possible. Messrs. C. Holdup and D. E. Castle have gone solo.

**WESTON.**
During the week ended June 12, 39 hr. were recorded. The C.A.G. section will take part in a National Service Rally on June 26 under the command of Mr. H. P. Wigg.

**LINCOLNSHIRE.**
Owing to high winds during two days of last week the club's flying times were reduced to 79 hr. Messrs. C. Tuxworth, C. Scarborough and G. Butterfield have gone solo.

**BEDFORD.**
High winds last week affected the club's flying time. Mr. G. Warwick has joined as a new member. There are more vacancies in the C.A.G. section for immediate flying.

**REDHILL.**
Flying time for last week amounted to 116 hr. Miss E. J. Wilson has gone solo. Seven machines took part in the "dawn patrol" at Wilmington last week end, four crews gaining free breakfasts.

**THANET.**
On June 9, 38 members of the C.A.G. section were joined by 14 Ipswich members for a parade and inspection by the Mayor of Ramsgate. During the week ended June 12, 191 hr. were recorded.

**WEST SUFFOLK.**
During last week 30 hr. flying time were recorded by club members. Messrs. H. H. Warwick and N. G. Palmer have joined the club as new members. A lecture was given last Thursday by P/O. Muller.

**HORTON KIRBY.**
During the week ended June 15, 199 hr. were recorded in the club's aircraft. First solo flights were made by Messrs. E. F. Cragg, E. Frenkle, J. R. Rusdell, C. Brouncker, J. M. Balfre and J. A. Tarratt.

**HANWORTH.**
C.A.G. members logged 122 hr. last week while 47 hr. were recorded by club members. Miss N. Young, Messrs. B. Bartholomew, D. S. Cropper, E. C. Fidgett, G. F. Hatch and H. J. Miller have gone solo.

**MARSHALLS'.**
The total flying time recorded during the past week was 117 hr. 50 min. Messrs. M. R. Alston, J. Heffer, L. Robinson, W. E. Bircham, P. J. N. Adshead and J. G. Osler have gone solo. Mr. G. C. Wright has passed his "B" licence tests.

**BRISTOL AND WESSEX.**
During the past fortnight 137 hr. were recorded. Messrs. R. A. Clapham, E. H. Robinson and T. H. Dingle have gone solo. The C.A.G. section has been divided into five flights, with 25 in each. The flights have unit and sub-unit leaders.

**PLYMOUTH.**
More than 107 hr. were flown during the week ended June 12. Mr. F. W. J. Hobbs went solo. Four courses of lectures have been attended by four groups of C.A.G. members. Drill parades are held weekly at the Royal Marine Barracks, Stonehouse.

**SOUTH COAST.**
During last week 94 hr. were recorded by the club. Mr. F. C. White and his son Mr. J. White flew in one of the club's machines to Derby for the Airport opening ceremony. A number of members took part in the Eastbourne "dawn patrol" last Sunday.

**CINQUE PORTS.**
Flying time for last week amounted to 61 hr. Mr. F. G. Simms has gone solo. The first contingent of the Oxford University Air Squadron arrived last Saturday for the annual camp.

**EXETER.**
Eighty-eight hours were flown during the week ended June 12. E. Haydon, L. H. Blackman, A. L. W. Neale, J. R. P. Heath and A. C. A. Harding went solo. A sergeant from Topsham Barracks drilled C.A.G. members. A dance will be held on July 1.

**IPSWICH.**
During the week ended June 12, 93 hr. were recorded. Miss M. Langford, Messrs. R. F. Hitchcock, H. P. Cooper and H. S. Grimsey went solo. On June 9, thirteen C.A.G. members and three officers flew to Ramsgate in seven machines to take part in a parade.

**NORWICH.**
Seventy-two hours were recorded by club and C.A.G. members. Dr. E. D. Sandison, Sir Eric Teichman, Messrs. G. I. M. Woode, J. Hitch, J. Donald, W. S. Key, I. Potts, E. D. Pearce, E. Steward-Anderson, A. R. Coleman, F. R. Davy, E. A. Redfern and J. D. Alston have gone solo.

**BROOKLANDS.**
Flying time for last week amounted to 114 hr. Messrs. Hordern, Crook and Fox have passed their "B" licence tests. The Hon. Ruth Cokayne has obtained her assistant-instructor's endorsement. Capt. Duncan Davis and Mr. K. Waller have been awarded the G.A.P.A.N. Master Instructors' Diploma.

### *Overseas*

**MADRAS.**
The total flying time for last month was 78 hr. 55 min. Many cross-country flights were carried out by club members, including one to Bombay. Mr. Perera has gone solo.

**RAND.**
During the first three weeks of May 361 hr. were recorded. Messrs. B. H. De Swardt, H. G. Keartland and C. B. Shelly have gone solo. The club is forming a Volunteer Reserve flight.

**PENANG.**
A total of 136 hr was recorded during the month of April. Mr. W. R Gardiner went solo. During the Easter holidays a number of cross-ccuntry flights were made, including one to Moulmein.

**HYDERABAD.**
Over 84 hr. were recorded during May. Capt. J. M. C. Hoblyn flew to Dhonakonda and returned the same day. Lt. R. G. Langan and Lt. Ushaq Ahmed Khan have joined the club as new members.

**BENGAL.**
The flying time for the month of April amounted to 135 hr. Mr. Chandmull Rajgariha has made his first solo flight. The club now possesses three aircraft and maintains the same number of privately owned machines

**JOHANNESBURG.**
During the month of April a total of 540 hr. was flown in the club's aircraft. Early in the month seven machines took part in the Port Elisabeth Air Rally. A successful cocktail party, organised by the ladies' committee, was held towards the end of the month.

**KARACHI.**
During the month of April over 204 hr. were recorded in the club's aircraft. In addition, 18 hr. were spent on the Link trainer. A number of charter flights were made, including one to Hyderabad for the Hon Mir Bunde Ali Khan.
The total flying time for May amounted to 148 hr. 55 min., which included 20 hr. 45 min. cross-country and 30 min. night flying. In addition to this, 23 hours were spent on the Link Trainer. Mr. Ujjal Singh completed his "A" licence tests.

**BOMBAY.**
Flying time for the month of April amounted to 183 hr., which is an increase of 42 hr. on the same period of last year. Messrs. M. A. Pattani and E. M. Cassinath made their first solo flights. Mr. N. K. Dubash has joined the club as chief pilot instructor. On April 30 His Highness The Nawab of Sachin attended a successful supper-dance organised by the club.
During May 244 hr. were recorded. Messrs. A. R. Mehta and B. B. Dhuru have gone solo. Mr. E. H. Pinto won the recent height judging contest while Mrs. J. P. E. Elworthy and Mr. H. S. Ratnagar won the Aerial Golf and general flying competitions respectively.

# TOPICS of the DAY

## As It Turns Out

IN spite of sundry C.A.G. ravings—mine about the essential half-heartedness of the scheme as it stands, and others, notably from newspaper magnates, about the half-million or so who would immediately be taught to fly—the whole thing seems to be settling down to its own routine without the help either of the critics or of the optimists.

When the scheme was first announced various people accused me of being pessimistic when I said that not more than 5,000 pupils would be trained in two years; their figures were in the hundreds of thousands. As it happens, even I was optimistic. The total is likely, it seems, judging from the few figures available, to be in the region of 3,000.

Not that there aren't quite a few individual clubs which have received as many as 3,000 or even 5,000 applications, but, one way or another, in each case this number has been slowly whittled down, when it came to actual training, into the hundreds—and very low hundreds at that. First there has been the reserved occupation difficulty in industrial districts, then there was the fairly simple medical examination which, strangely enough, cannot be passed by more than a certain proportion of the applicants, and finally, there is the aptitude difficulty.

**LUNAR LANDSCAPE: The Western Hajar mountains of the Oman Peninsula in the Persian Gulf. No vegetation, no sign of life, "no nothing"—just fold after fold of sun-baked rock.**

At the moment, the bigger clubs appear to have settled down to the job of training their hundred or so each, and they are looking forward to two more years of continuation training of the same pupils with a few more score added from time to time. Now, too, the scheme has been modified to some extent, in that nobody over forty years of age and no women are encouraged to join. Even among the remainder, age is now the priority decider. The thing boils down to a means of making use of the clubs for the *ab initio* training of young men who might be considered to be fit in every way for military flying duties.

Nobody appears to have taken any great notice of my recurrent demand that owners and club pilots of reasonable experience should, through the scheme, have the opportunity of putting in a really useful number of advanced tuition hours, so I will make another suggestion which is, I must admit, not my own.

The other day I heard it suggested that the clubs might be used as training grounds for conscripts or Militiamen who volunteer to fly rather than carry out other duties. Those who volunteer would, of course, need to pass a complete R.A.F. medical examination, and to be considered in every way fit to serve as pilots with the R.A.F. In the six months' training period, given reasonable weather, every one of the volunteers could put in more than 100 hours' flying and be quite ready, thereafter, to move on to real Service training schools, with military types, gunnery and all the rest of it. The time should have quite gone when the answer to that sort of thing was that it was no use training somebody on a Moth if he was going to need to fly a Wapiti or a Siskin. Apparently Tiger Moths are considered to be ideal primary training types, and the pilots at the Volunteer Reserve schools have no difficulty, at the end of 50 hours or so on Tigers, in going off in Harts after a couple of hours' dual.

## The Pupils

THOSE who prophesied astronomical figures for C.A.G. trainees overlooked one or two very important facts. Apart from the clubs' own difficulties and the badness of the British weather, a large amount of the very best material (not using the word in the cannon-fodder sense) had already turned automatically either to the Auxiliary squadrons or to the Volunteer Reserve, whereby they could do far more and interesting flying than any provided at the clubs. Also, a proportion of the best among those who were not fitted for Reserve flying had been sufficiently keen to learn to fly at the old club rates. There remained only those who have been turned down on various grounds by the Air Ministry, those who were not keen enough to fly before, and those who honestly could not afford to learn to fly at the original rates.

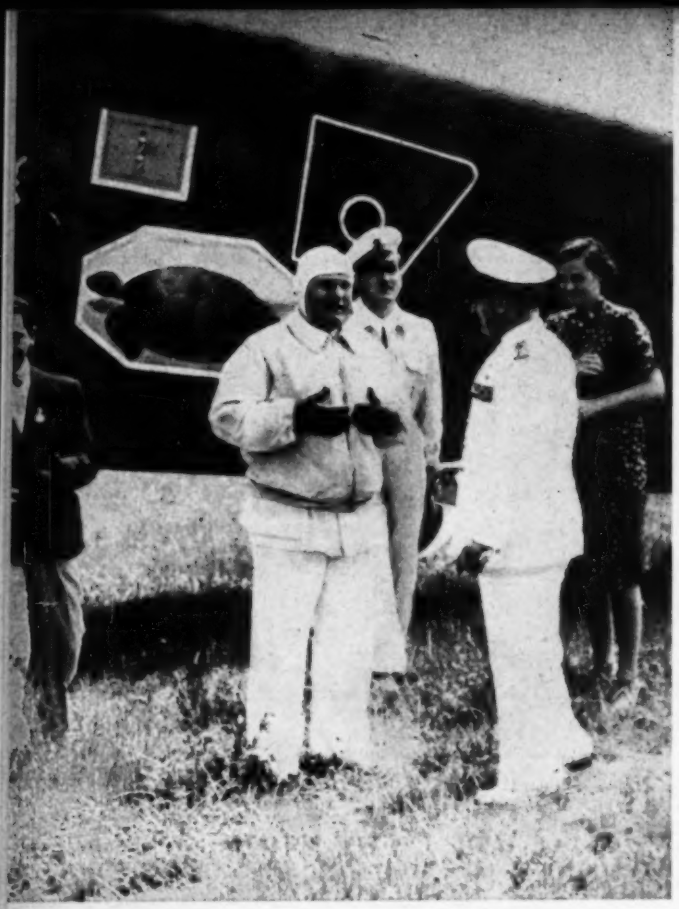
The best pilots were not therefore available, and the result is that a far greater proportion of C.A.G. members are turned down, at or after the six-hour limit, than might have been expected. In the old days, admittedly, a few members of every club carried on with their dual instruction well into double hourage figures, because they were determined, and the club concerned was, in any case, losing little on the deal. Nevertheless, probably 95 per cent. of the members went solo in less than 12 hours' dual.

And I must say that the insurance interests, who were so considerably criticised a few months ago when they announced an increase in their rates, seem to have been proved to be pretty well right. In spite of the fact that C.A.G. members are more carefully looked after and more severely disciplined than the others, the breakage bill is now, I believe, higher than it was in proportion to the number of hours flown. The reason being partly that the standard of natural aptitude among the newcomers is lower, and partly because, rather naturally, some clubs tend to push their members into the air and through their "A" Licence tests rather sooner than they ought to do.

## Giving Lightweights a Chance

SOME time ago I discussed on this page the possibility of producing cheaper and smaller controllable pitch airscrews for use in light aeroplanes. It seemed to me that this type of airscrew was an obvious development for all types—and more so for what used to be called the ultra-light, which are flying already on a minimum of power.

(*Continued on page c.*)



Signor Mussolini leaves the Savoia after giving the delegates a joy-ride.

# GUIDONIA on SHOW

## *Sky-shaking and Crowd-scattering by the Regia Aeronautica : The Duce as Joy-ride Pilot*

By "CONGRESSISTA"

AS the high-light of the First World Congress of the Aeronautical Press at Rome, delegates were taken to the research city of Guidonia on Sunday, June 11, to see a flying display and to meet the Duce. This, incidentally, was almost the only truly aeronautical event in a full and varied programme designed for the amusement and education of the participants—if one excepts the "air rally" of arriving journalists on the preceding Sunday.

We were driven out to Guidonia in tourist cars. In Rome the use of motor-horns is forbidden, but once out of the city the driver's pent-up emotions are relieved by a continuous pressure on the horn button, interspersed by reluctant periods of silence while he pauses to rest his finger.

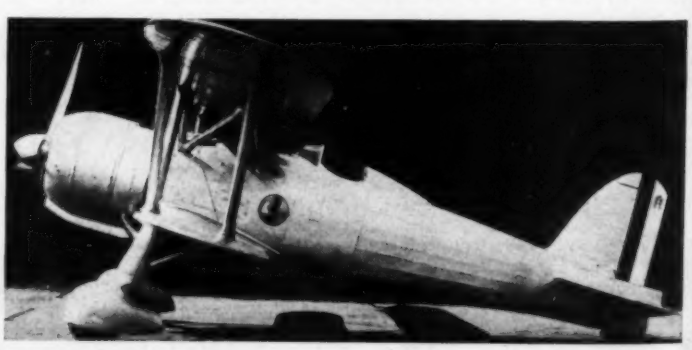
The extensive white buildings of the station, lying at the foot of the steep dark Sabine hills, showed up vividly in the sunshine. We were driven to the tarmac—nearly a mile from the gates—where various experimental aeroplanes were drawn up in line. The machines shown were a Macchi C.200 single-seater fighter, a Fiat G.50 and a Caproni, apparently built to the same specification ; a new Piaggio twin-engined fighter ; a Caproni and a Savoia-Marchetti, both apparently twin-engined reconnaissance types ; a four-engined Piaggio bomber, and the three-engined "Procellaria" high-speed load carrier ; a civil Savoia-Marchetti S.83 carrying the "three green mice" marking of the squadron which contributed its machines to the South American flight last year ; a Fiat C.R.42 biplane fighter ; the early type of Caproni height-record biplane, and two early three-engined Savoia-Marchettis, one with service camouflage and the other bearing civil markings, parked by themselves. The camouflaged machine was brilliantly painted in grass-green and gold, by contrast with the sober chocolate-brown and sage colours which blend with our duller landscapes.

Standing around on the tarmac, we were told that we could examine the machines ; however, when too close an examination was attempted, it seemed that the urgency of the programme made it essential for us to be kept on the move. At the end of the line, we awaited the arrival of Signor Mussolini, who inspected a guard of honour composed of the Regia Aeronautica (in blue-grey uniforms extraordinarily like those of the R.A.F.) and a squad of white-clad officers. Then the flying display began.

Unfortunately, as on so many English flying-fields, the buildings at Guidonia are on the north side of the aerodrome, so that we stared into the eye of the sun. The first event was the arrival of six flights of five Fiat C.R.32s which looped in formation, to a chorus of awed gasps from the air correspondents of the world. They returned at intervals, to give displays of rolls in flight formation, loops in flight line astern changing to flight vees in the preliminary dive, loops in line astern, the famous "crazy line" abreast, and finally a ground attack by one flight. The manœuvres were carried out lower than is usual in this country—but it may have been the healthy hay-crop which strengthened this impression! Individual machines were all well handled, but the formations lacked cohesion. The formation landing of one flight had a certain ecclesiastical association that must surely have been the fault of the pilots, since the virtues of the Fiat have been so persistently extolled that we cannot attribute it to the machines.

A flight of five Fiat G.50 monoplanes came over twice, first in a dive and zoom, later doing a formation loop with the familiar modern radius of a thousand feet or so. The Macchi C.200 and Fiat C.R.42 were demonstrated in individual aerobatic displays. The former is an all-metal stressed-skin monoplane, rather like the Gloster multi-gun fighter, with an 850 h.p. Fiat radial engine, and its speed is about 315 m.p.h. The manufacturers claim that it has been "energetically pulled out" of a 10,000ft. dive at over 500 m.p.h. "without the slightest inconvenience" —except, one presumes, to the pilot. The machine was demonstrated in a series of fairly steep dives and zooms, over and past The Leader. The C.200—travelling at about 400 m.p.h.—was brought down to within twenty or thirty feet of the ground. It seems strange that the Duce's life should have been risked in this way. In all but the ground-attack demonstrations he appeared to be used as the focal point for manœuvres in which the very slightest error of judgment would have proved fatal.

At the top of his zooms the pilot did a flick roll. Once



The display by the Fiat C.R. 42 "was what would be expected from a clean biplane."

he attempted it too soon, and the result was a wide barrel roll ending about thirty degrees off his course. Other manœuvres were loops and stalled turns, all of a rather wide radius.

The Fiat C.R.42 is a Warren-truss-braced biplane developed from the C.R.32 as a result of the experience gained in Spain. The engine is also a Fiat radial of 840 h.p. Maximum speed is about 280 m.p.h. This display was what would be expected from a clean biplane. The take-off was very good by modern standards; the whole range of aerobatics was performed smoothly and efficiently, giving a very good impression of the machine.

The final event was a dive-bombing attack by a flight of the new Savoia-Marchetti twin-engined single-seater attack monoplanes. These machines dived almost vertically, using air brakes, on an imaginary target in the centre of the aerodrome, and then roared overhead in a shallow dive with their engines opened out and brakes off.

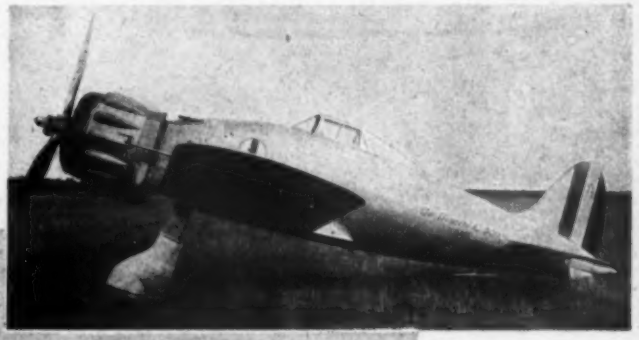
Then, to challenge our shaken nerves, the height-record Caproni, drawn up about a hundred yards away, opened out and charged straight down upon us and, while we instinctively ducked, was off the ground and high in air before it had covered one-third of the distance.

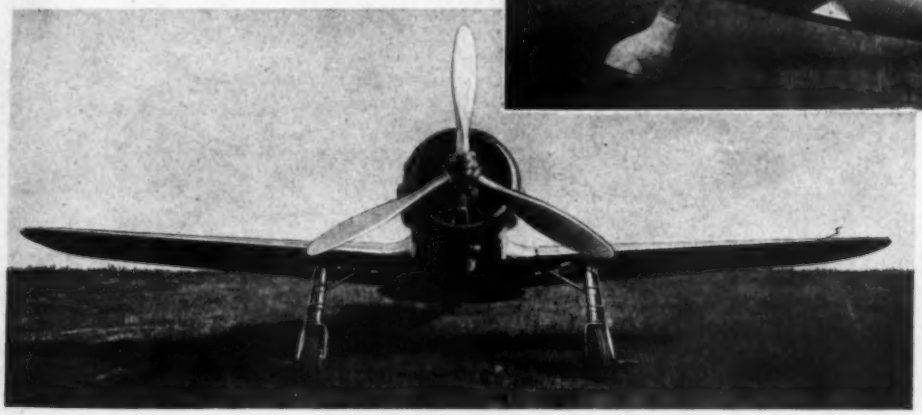
One final surprise was reserved for us. In the almost grave-like hush which succeeds the roar of a flying display, Signor Mussolini hurried to one of the Savoias and climbed into the pilot's seat. The whisper went round that the senior aeronautical journalists were to be honoured by a "joy-ride" at the hands of the Great Man himself. We could scarcely believe our eyes when we saw one of our own group—famed for his rabid avoidance of any form of air transport and his no less fervent admiration of dictators—climb into the machine. Evidently the latter sentiment had prevailed over the former!

The Savoia took off (did we glimpse a second figure in the co-pilot's seat?) accompanied by its sister machine, loaded with a bevy of photographers.

When the two Savoias came down we were taken on a quickly conducted tour of the research buildings. Guidonia has been described before, so it will suffice to say that the whole station is beautifully laid out on a spacious scale, and includes the most up-to-date equipment. Everything has been designed, in true Italian fashion, to combine the maximum scenic effect with the most practical of scientific apparatus.

**The headquarters building at Guidonia.**





**Another modern Italian type demonstrated was the Macchi C.200 single-seater fighter. With an 840 h.p. two-row Fiat A.74 RC the top speed is in the region of 315 m.p.h.**

## TOPICS of the DAY

*(Concluded from page a).*

The other day I was talking to an assistant designer at an aircraft firm, and he was quite convinced that the cheap light aeroplane would not be a practical possibility until power units were designed for it with all the aids to performance which are found on larger and more expensive units. It is, after all, the low-powered engine which most requires reduction gear and a c.p. airscrew. Until they are available, light aeroplane flying will remain in the fixed-gear, belt-drive, necessarily overpowered big-twin era of the motor cycle.

I can imagine nothing more wasteful or inefficient than, say, a 60 h.p. engine for which a fixed pitch airscrew has to be designed to provide the best compromise between take-off and maximum level cruising speed. Only the very fluidity of the air, which gives something like an automatic variable gear effect, makes such a thing possible at all. It is manifestly absurd for an engine which has been designed to give maximum power at, say, 2,500 r.p.m., to be turning over at only 2,000 r.p.m. during the very period when maximum power is most earnestly required. The only way to obtain this maximum power for take-off is in the provision of reduction gears and controllable pitch airscrews.

If we forget for a moment the fashion for fancy prices in the aircraft manufacturing industry, there seems to be no possible reason why engines with such gears and airscrews should not be produced cheaply. The prospective car purchaser would be very angry indeed if his gear box was only offered to him as an extra at a cost almost equal to that of the car itself. In my ignorance, at any rate, it seems to me to be simply a matter of getting down to design for cheaper production. Just at the moment there are at least two inexpensive types of c.p. airscrew being developed—one in this country and one on the Continent. Probably there are more.

INDICATOR.

# THE ROYAL AERO CLUB

## *News and Official Notices for the Week Ended June 17*

### *Seven Races in a Day*

SEVEN air races at one aerodrome in one day: that will be the effect of the present arrangements for running the King's Cup Air Race and the Wakefield Trophy Air Race at Birmingham Airport on September 2. Both events will be flown in a series of heats, the first of which will start at 9.30 in the morning. The final of the King's Cup is expected to finish about 5.30 p.m. Wakefield Trophy and King's Cup heats will alternate and each one will be completed within the hour. This is believed to be the most intensive day of air racing ever planned in this country.

Handicapping methods are such that each section will be complete in itself so that the spectators will have full value of racing tactics and suspense as to the final winners will be maintained. The King's Cup Race this year is open to aircraft without limitation as to engine capacity, but the aeroplanes must be of British manufacture. The Wakefield Trophy is open to aircraft of the type built for Civil Air Guard training. It is the first time that this contest has been held.

### *Pilot Instructors*

PILOT instructors in the R.A.F. Reserve who are employed by clubs engaged in Civil Air Guard work will be exempt from their annual Reserve training, according to a decision arrived at by the Air Ministry in consultation with the General Council of Associated Light Aeroplane Clubs. The difficulty of maintaining the high rate of C.A.G. pilot output if the instructors were liable to be called up for R.A.F. training has led to this special provision. Clubs whose pilot instructors are affected are therefore asked to forward immediately to the Air Ministry the names of the instructors whom they wish to recommend for exemption.

### *Channel Flight Anniversary*

THE French Ambassador and the air ministers of Great Britain and France will be present at a dinner to be given on July 25 at the Dorchester Hotel to commemorate the thirtieth anniversary of the first aeroplane flight across the English Channel by M. Louis Bleriot. The dinner is being arranged by the Alliance Francaise, and all who are interested in aviation are invited to attend.

M. Bleriot used one of his own early monoplanes for this great flight. He landed on the cliffs of Dover, where there is now a memorial to the flight. Tickets for the dinner may be obtained from the Hon. Secretary of the Alliance Francaise, 78, Crescent Road, Reading.

### *On the Air Routes*

FRANCE.—According to a recent notice issued by the French Government, the signal to an aircraft that it should change its course because it is in the vicinity of a prohibited area will be two bursts in front of and along the course followed by the aircraft. The signal that an aircraft is required to land will be three bursts at intervals of ten seconds spaced along the course followed by the aircraft. Aircraft failing to observe the above instructions will run the risk of being fired on with live ammunition.

GERMANY.—The boundaries of the Palatinate prohibited area have been altered as follows: Kaiserslautern-Neustadt (exclusive); Geemersheim-Carlsruhe (exclusive); Steinbach; point of intersection of the Reich frontier and the line joining Steinbach and Hagenau-Reich frontier; point of intersection of the Reich frontier and the Hornbach-Wolmünster railway line; railway line from Hornbach-Zweibrücken Homburg-Landstuhl to Kaiserslautern.

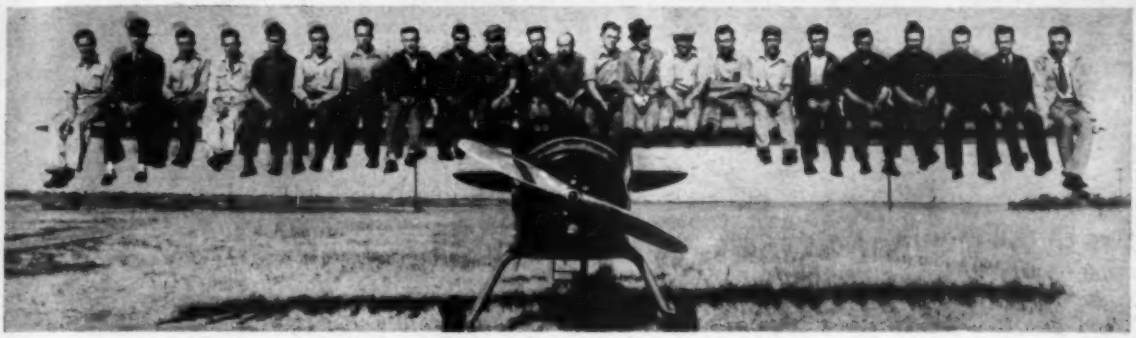
## *Aviators' Certificates*

| No. | Name | Club or School | Date |
|---|---|---|---|
| 18,474 | Norman Manby | Northants Aero Club | 7.5.39 |
| 18,475 | William Edward Warcup | Newcastle-on-Tyne Ae. C. | 1.6.39 |
| 18,476 | Sidney Joseph Pollock | Newcastle-on-Tyne Ae. C. | 28.5.39 |
| 18,477 | William James Boal | Civil Service Flying Assn. | 30.4.39 |
| 18,478 | Reginald William Evered | Civil Service Flying Assn. | 21.5.39 |
| 18,479 | Donald Macdonald | Cardiff Aeroplane Club | 2.6.39 |
| 18,480 | Vincent Gerard Sullivan | Cardiff Aeroplane Club | 2.6.39 |
| 18,481 | John Lawrence Barber | Portsmouth Aero Club | 2.6.39 |
| 18,482 | Geoffrey Stedman Farmer | South Coast Flying Club | 24.5.39 |
| 18,483 | William Charles Stanbury | London Air Park Flying Club | 31.5.39 |
| 18,484 | Frank Micklethwaite | York and Leeming Ae. C. | 31.5.39 |
| 18,485 | Michael May | Brooklands Flying Club | 26.5.39 |
| 18,486 | David Gordon Shiach | Scottish Flying Club | 29.5.39 |
| 18,487 | Robin Douglas Gray | Scottish Flying Club | 24.5.39 |
| 18,488 | Harry Francis Marks | Exeter Aero Club | 27.5.39 |
| 18,489 | Herbert James Pendleton | Exeter Aero Club | 6.5.39 |
| 18,490 | William Graham Foxall | Exeter Aero Club | 14.5.39 |
| 18,491 | Albert Philip Nicoll | Strathtay Aero Club | 25.5.39 |
| 18,492 | Ronald Charles Spiller | Exeter Aero Club | 19.5.39 |
| 18,493 | Henry John Scanes | Exeter Aero Club | 28.4.39 |
| 18,494 | John Raymund Binns | Herts and Essex Aero Club | 30.5.39 |
| 18,495 | Thomas Bruce Child | Herts and Essex Aero Club | 30.5.39 |
| 18,496 | Richard Hicks Jane | Coventry Aeroplane Club | 31.5.39 |
| 18,497 | Malcolm Todd Matthews | Bristol and Wessex Ae. C. | 27.5.39 |
| 18,498 | Joan Warwick Langman | Northern Aviation Club | 29.5.39 |
| 18,499 | Reginald Copley Cain | Northern Aviation Club | 25.5.39 |
| 18,500 | Frank Herbert Fell | Plymouth Aero Club | 30.5.39 |
| 18,501 | Robin James Dunsmuir | Isle of Wight Flying Club | 1.6.39 |
| 18,502 | Sydney Shepherdson | Hull Aero Club | 29.5.39 |
| 18,503 | Dan Walker | Horton Kirby Flying Club | 23.5.39 |
| 18,504 | Trevor Sherlock Gooch | Horton Kirby Flying Club | 26.5.39 |
| 18,505 | Michael Francis Culhane | Horton Kirby Flying Club | 31.5.39 |
| 18,506 | Thomas Cyril Boulton | Eastbourne Flying Club | 8.5.39 |
| 18,507 | Percy Henry Olieff | Eastbourne Flying Club | 24.5.39 |
| 18,508 | Leslie Arthur Daniel | Eastbourne Flying Club | 25.5.39 |
| 18,509 | Alexandra Cameron Michelmore | Lincolnshire Aero Club | 28.5.39 |
| 18,510 | George Alfred Hannington | Lincolnshire Aero Club | 31.5.39 |
| 18,511 | Ralph Woolhouse Hobson | Lincolnshire Aero Club | 15.5.39 |
| 18,512 | Malcolm Howard Genney | Lincolnshire Aero Club | 1.6.39 |
| 18,513 | John Bennett | Cotswold Aero Club | 4.6.39 |
| 18,514 | Marion Ackroyd Jackson | Newcastle-on-Tyne Ae. C. | 3.6.39 |
| 18,515 | Robert William Johnson | Liverpool and Dist. Ae. C. | 14.5.39 |
| 18,516 | Thomas Jenner | Thanet Aero Club | 25.5.39 |
| 18,517 | Robert Duff Mackenzie | Liverpool and Dist. Ae. C. | 7.5.39 |
| 18,518 | Gordon Hughes Gratton | Liverpool and Dist. Ae. C. | 7.5.39 |
| 18,519 | William Thomas Rootes | Malling Aero Club | 5.6.39 |
| 18,520 | Gordon Webster McCash Neill | Strathtay Aero Club | 28.5.39 |
| 18,521 | Robert Lewis Beverley | Reading Aero Club | 22.5.39 |
| 18,522 | Hillard Slavid | London Aeroplane Club | 4.6.39 |
| 18,523 | Harold John Aldington | London Aeroplane Club | 28.5.39 |
| 18,524 | Francis Robert Benjamin King | London Aeroplane Club | 31.5.39 |
| 18,525 | William David Wilson | Eastbourne Flying Club | 24.5.39 |
| 18,526 | Dafydd Garn Protheroe | Eastbourne Flying Club | 25.5.39 |
| 18,527 | John Leslie Burnett | York and Leeming A.C. | 6.6.39 |
| 18,528 | William Gladstone Morris | Liverpool and Dist. Ae. C. | 23.5.39 |
| 18,529 | Denis Gordon Fawcett | Liverpool and Dist. Ae. C. | 18.5.39 |
| 18,530 | Dennis William Stirzaker | Liverpool and Dist. Ae. C. | 21.5.39 |
| 18,531 | Geoffrey Lunt | Liverpool and Dist. Ae. C. | 20.5.39 |
| 18,532 | George Frederick Weld Blundell | Liverpool and Dist. Ae. C. | 21.5.39 |
| 18,533 | George Henry Green | Liverpool and Dist. Ae. C. | 21.5.39 |
| 18,534 | Albert Williams | Liverpool and Dist. Ae. C. | 27.5.39 |
| 18,535 | Ronald Burns | Liverpool and Dist. Ae. C. | 20.5.39 |
| 18,536 | George Quillian Atkinson | Liverpool and Dist. Ae. C. | 27.5.39 |
| 18,537 | George Clayton Gill | Liverpool and Dist. Ae. C. | 21.5.39 |
| 18,538 | Charles William Hucks | Liverpool and Dist. Ae. C. | 20.5.39 |
| 18,539 | John Conran Stewart-Clark | Edinburgh Flying Club | 1.6.39 |
| 18,540 | Leslie Arthur Woodroffe | Southend Flying Club | 6.6.39 |
| 18,541 | Wilfred Lewis Mundy Merrett | Bristol and Wessex Ae. C. | 28.5.39 |
| 18,542 | Gilbert Thomas Hart | Thanet Aero Club | 6.6.39 |
| 18,543 | Joan Maxwell Isemonger | Cinque Ports Flying Club | 29.5.39 |
| 18,544 | Manuel O'Brien | Cinque Ports Flying Club | 25.5.39 |
| 18,545 | Bernard Ullathorne Veal | York and Leeming F.C. | 4.6.39 |
| 18,546 | Clarence Alexander Upson | Southend Flying Club | 20.5.39 |
| 18,547 | Kenneth Thomas Graywood Gillespie. | Horton Kirby Flying Club | 2.6.39 |
| 18,548 | Douglas Seagrave | Doncaster Aero Club | 30.5.39 |
| 18,549 | Stanley Raymond Sarginson | Midland Bank Flying Club | 1.6.39 |
| 18,550 | William Charles Yetton | Midland Bank Flying Club | 4.6.39 |
| 18,551 | Clive Finney | Midland Bank Flying Club | 3.6.39 |
| 18,552 | Eric McClunan | Malling Aero Club | 5.6.39 |
| 18,553 | Nancy Elizabeth Crinage | Isle of Wight Flying Club | 5.6.39 |
| 18,554 | John Scott Cooper | Edinburgh Flying Club | 22.5.39 |
| 18,555 | Hugh Charles Bergel | Reading Aero Club | 21.5.39 |
| 18,556 | James Leadbeater | Liverpool and Dist. Ae. C. | 26.5.39 |
| 18,557 | Alfred Horrocks | Northern Aviation Club | 1.6.39 |
| 18,558 | Sydney Harrison Pallant | Northern Aviation Club | 1.6.39 |
| 18,559 | Benjamin Passmore Greenwood | Horton Kirby Flying Club | 4.6.39 |
| 18,560 | Colin Forth | Doncaster Aero Club | 7.6.39 |
| 18,561 | Winifred Mary Brompton | Lincolnshire Aero Club | 4.6.39 |
| 18,562 | Eric Stanley Green | Lincolnshire Aero Club | 4.6.39 |
| 18,563 | Leonard Thomas Kinchin | West Suffolk Aero Club | 6.6.39 |
| 18,564 | Cyril Walter Smith | West Suffolk Aero Club | 31.5.39 |
| 18,565 | Frank Kaegi | West Suffolk Aero Club | 6.6.39 |
| 18,566 | Sidney Bertram Bedford | County Flying Club | 28.5.39 |
| 18,567 | Robert William Teear | County Flying Club | 31.5.39 |
| 18,568 | Joan Birley | Liverpool and Dist. Ae. C. | 28.5.39 |
| 18,569 | Frank William Gattrell | Lancashire Aero Club | 1.6.39 |
| 18,570 | William Percival Hutchinson | Tollerton Aero Club | 29.5.39 |
| 18,571 | Mary Oldham Ferguson | Tollerton Aero Club | 24.5.39 |
| 18,572 | William Bernard Pilgrim | Tollerton Aero Club | 27.5.39 |
| 18,573 | Donald James Greenhill Duncan | London Aeroplane Club | 7.6.39 |
| 18,574 | Hugh Blackall | London Aeroplane Club | 7.6.39 |
| 18,575 | Barbara Mary Spencer | Hull Aero Club | 5.6.39 |
| 18,576 | William Leslie Page | Hull Aero Club | 6.6.39 |
| 18,577 | Charles Edward Macklin | Hull Aero Club | 4.6.39 |
| 18,578 | Edgar Ewart Hoy | Hull Aero Club | 4.6.39 |
| 18,579 | Sydney Hastings Dowse | No. 16 E. and R.F.T.S., Shoreham. | 3.6.39 |
| 18,580 | Felix Hugh Lawrence Scarlett | Air Service Training, Hamble. | 2.6.39 |
| 18,581 | Hugh Mercier Todd | York and Leeming F.C. | 4.6.39 |
| 16,682 | Reginald Gregory Burton | Cinque Ports Flying Club | 23.5.39 |
| 18,583 | Kenneth William Birt | Wiltshire Flying Club | 29.5.39 |
| 18,584 | Stanley Walter Turner | West Suffolk Aero Club | 6.6.39 |
| 18,585 | William Gildroy Shaw | York and Leeming F.C. | 3.6.39 |
| 18,586 | John Metcalfe Nicol | Midland Bank Flying Club | 6.6.39 |
| 18,587 | Spence Mallen | Newcastle Aero Club | 3.6.39 |

# A CIVIL SELECTION

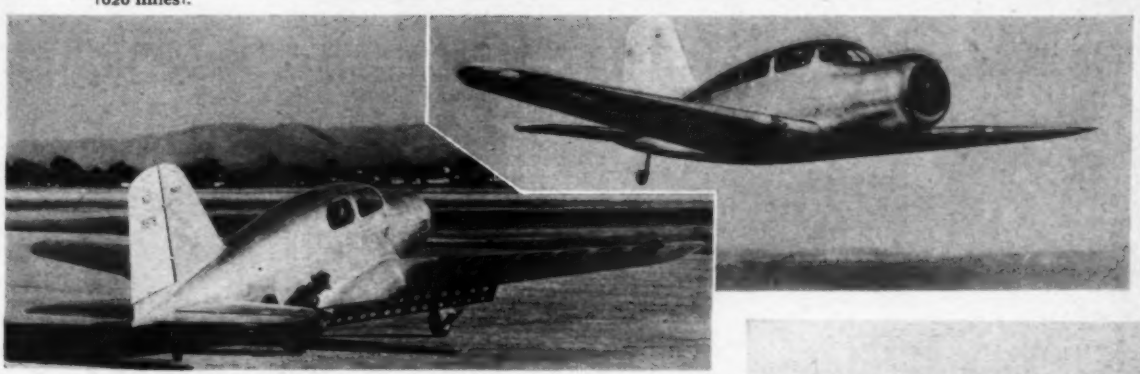
## *Some Recent Productions*

With two 225 h.p. Jacobs engines the new American five-passenger Cessna (right) cruises at 193 m.p.h. and lands at 55 m.p.h. Other pertinent figures are, initial climb, 1,500 ft./min.; gross weight, 5,000 lb., and span, 42 ft.

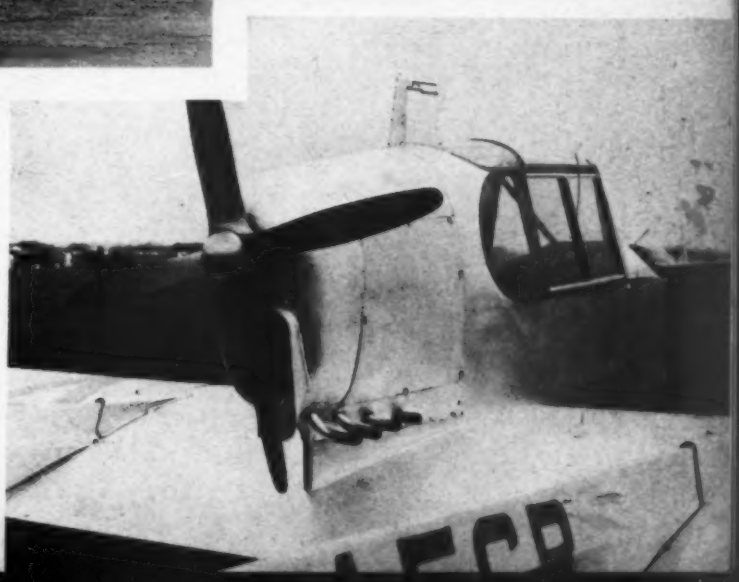


(Above) Twenty-three men load the wing of a 1939 Cessna Airmaster to 4,000 lb. The wing normally supports a gross load of 2,350 lb.

(Right) Remarkable largely for its very clean aerodynamic form, this new German Möller single-seater, on the mere 53 h.p. of a Zündapp engine, recently averaged 185.4 km./hr. (115 m.p.h.) over 100 km. (62 miles) and 187.8 km./hr. (116 m.p.h.) over 1,000 km. (620 miles).



(Above) Two views of the new American Harlow two/four seater lightweight (or nearly so), some details of which were given in *Flight* of April 13. It is of all-metal construction and has a top speed of 170 m.p.h. The perforated flaps are interesting, and should act as air brakes rather than as lift flaps.



The Arpin two-seat pusher (which was one of the pioneer "tricycle" designs in this country) is now flying with a Cirrus Minor engine in the new cowling seen here. The prototype had a Salmson.

*"Flight" photograph.*

# THE MODERN AIRCRAFT COMPASS

## *Some Notes on Present Types and on Possible Developments in the Near Future*

By FRANCIS CHICHESTER.

PILOTS and navigators are rebelling against the existing type of bowl compass with horizontal face, which is, in fact, almost the only kind of compass in use in Great Britain to-day.

The chief complaint is the difficulty of reading it. With a horizontal face it must be placed in such a position that the pilot can look down on it, or, if it is inverted, look up at it. This limits its position. It must either be placed low at the side of the pilot's seat, in front of it, or above his head.

The most popular of these positions has been that in front of the pilot's seat, where the compass is usually on a stand. Unfortunately, the control stick is then between it and the pilot. When the control was a plain column the pilot did not have so much difficulty in reading the compass behind it, but to-day it usually has a spade or wheel grip and he must lean forward or to one side to read it.

If the instrument is on the floor beside the seat, the pilot must screw round and look down every time.

Also, in these positions, unless the grid wires are parallel or perpendicular to the vertical plane through the line of sight, the magnetic needle makes a different angle with them when the aeroplane is climbing or descending; and if the pilot keeps the needle apparently parallel with the grid wires, he may be off course.

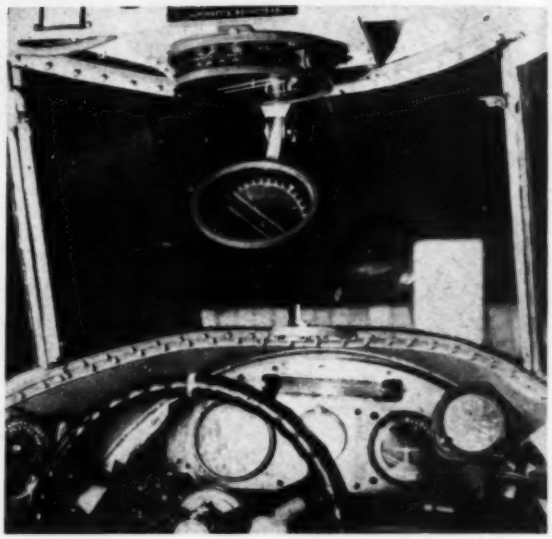
This parallax error is avoided in the inverted compass suspended from the roof. The pilot looks into a mirror beneath the compass, and the line of sight is vertical from the mirror through the glass bottom of the bowl. By this means the error of parallax, when the bowl is tilted in a climb or dive, is reduced to a minimum, which can, in general, be neglected. Taking deviation into consideration as well, this position is far the best that has yet been found for a magnetic compass. Not only is the performance better there than in any other practicable situation, but also, the course can be read very accurately against a lubber line on an external verge ring as soon as the grid wires have been lined up with the needle. It has another advantage—it is in the most natural direction possible for a pilot to look, i.e., before his eyes and only slightly above.

### *Retaining the View*

It is true that at first he may not like viewing the compass in a mirror, but this becomes quite natural as he gets accustomed to it. He may also object that it cuts out some of the view; but if the mirror is close under the compass face he can see below it and to the side; if several inches below the compass, he can see well round it; the mirror can be swung up against the compass face when not required, so that the view is unobstructed for landing.

In front of the pilot's seat, or beside it, the aperiodic compass often suffers badly in modern aircraft from change in deviation due to varying magnetic disturbance in the vicinity. When various electrically operated instruments are switched on, it may deviate several degrees, and, when the lights are put on, several degrees more. In a bomber every fresh load of bombs may cause a different deviation.

In addition to the change caused by these, a further change of as much as 20 degrees can be caused by the generator when that is turned on. As far as the pitot heater, lighting, equipment, etc., are concerned, the compass could be adjusted for deviation. For example, the aeroplane could be swung once with the pitot heater on, again with the pitot heater and airscrew anti-icer on, and a third time with the airscrew anti-icer and the night lighting on. But it would have to be done for so many combinations that it would be impracticable, and it is quite enough complication for the pilot if he has only two deviation tables to refer to—one for when the aircraft has been swung with everything off, and the other for when everything except the generator has been on. The generator disturbance sometimes cannot be allowed for because its output varies in flight as the batteries are charged, and in this case *the generator must be turned off* every time a fairly accurate compass reading is required.



**The roof-mounted P.4 compass in the Short-Mayo *Mercury*. For taking-off or landing the mirror shuts up flat against the compass-face and does not obstruct the pilot's view.**

An inverted compass slung to the roof of the same aeroplane and read at the same time as a compass beside the seat showed a total change in deviation of 4½ degrees compared with the 12½ degrees of the compass beside the pilot's seat. But for electrical connections and switches near it in the cabin roof it might have been free from deviation.

What the pilot would like, to my mind, is a vertical reading compass which can be set in the instrument panel amongst the other instrument dials. He wants it to show at a glance the course on which the aeroplane is flying, and he does not wish to have to adjust grid wires before he can do so. At the same time, he needs an instrument fitted with a course indicator to fulfil the function of grid wires and show at once if he is off course at all; it is too much to expect a pilot to remember throughout a long flight the exact course which he is steering.

There are two ways of satisfying this demand. One is to revert to an early type of magnetic compass used in aeroplanes; in its most familiar form it had a compass card rotating on a pivot and behind a glass face. The card had a vertical scale round the edge, which was visible at an aperture in the instrument panel. The course flown is indicated by a lubber line behind the glass face. The type was much used in the war, but was then in a crude state of development, and only indicated the cardinal points, North, North-east, East, etc. The navigation practised in the early stages of flying had no need of finer division of the compass card, but this coarse division created an impression that the compass could not indicate more accurately. This is not so in fact—it could be read accurately to 1 degree if the card were big enough to be so divided.

One great advantage of this instrument over the usual compass is that it indicates at once, without interpretation or adjustment of the verge ring, the course on which the aeroplane is flying. It has always been much in favour in the U.S.A. (five out of seven compasses in Pioneer's catalogue to-day are of this type), but that is no argument in its favour as far as the British pilot is concerned, because, rightly or wrongly, he considers the American mostly flies on radio ranges.

However, Hughes have now developed and refined an instrument panel compass of this type, graduating the card into 5° units and supplying it with a course indicator to take the place of the grid wires on the horizontal faced type. It must be admitted that the performance is excellent for turning error, aperiodicity and steadiness of reading. It will be in the position that the pilot asks for in the instrument panel, and although it will only be readable to 2½° instead of 1°, as are the large horizontal faced compasses, it will not be disturbed much more in the instrument panel by changing magnetic fields nearby than is the other type in front of the control stick.

The alternative for an instrument panel compass is some completely new departure in design, such as the Kollsman Direction Indicator. This instrument has powerful magnets, heavier than usual, enclosed in a float on a pivot. The float is in liquid which takes most of the weight. In a separate compartment above the float chamber there is a slave magnet which must follow the powerful master magnets below; the slave is attached to a vertical shaft and the movement of this is transmitted by means of a pinion drive to a horizontal shaft with an indicator hand attached. The indicator operates in front of a vertical dial in the instrument panel. Somewhat naturally, this instrument has its own particular characteristics, but it also has the special advantage that it indicates the direction without the necessity of first adjusting grid wires to the indicating hand, while, at the same time, it has a grid arrow which can be rotated to show the pilot the course he is trying to keep.

### *Well Established*

Any magnetic compass in the instrument panel must suffer from disturbance by changing magnetic fields near it as much as, if not more than, a compass in front of the pilot's seat, and both must be much inferior in performance in this respect to a compass mounted high above disturbing forces.

Although the magnetic compass is suffering more and more from this changing deviation trouble, and although in its present form it is always more or less out of action in a short steep turn (due to turning error when the vertical component of the earth's magnetic force acts on the compass magnets in an apparently horizontal direction, or to acceleration of the aircraft causing the needle to overswing) it will be found a tough customer to supplant. To begin with, it is simple and almost foolproof; a needle on a pivot has very few parts which can go wrong, and a pilot can feel certain of its giving him the north with more or less accuracy throughout every flight for years.

The bowl, the needle, the pivot, the lighting, etc., have a number of refinements which demand highly skilled workmanship on the part of the maker, but, generally speaking, it is an inexpensive instrument. If it is properly adjusted for deviation it reads to an accuracy hard to beat. Finally, it is light.

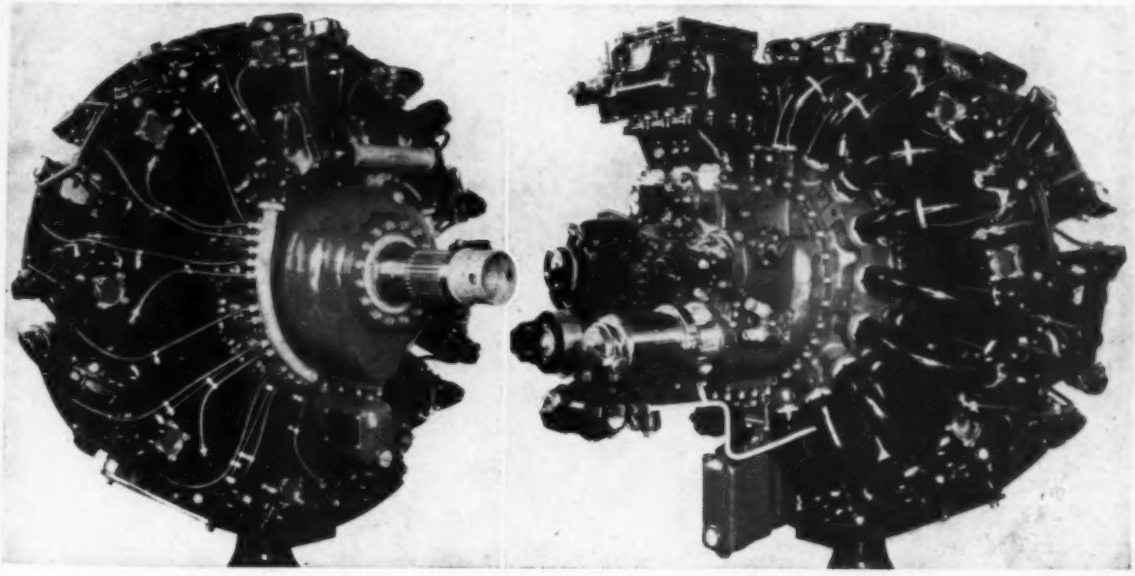
What signs are there of any new form of instrument which will take its place or compete with it? Throughout a turn the directional gyro shows the true amount of that turn, and the importance of this cannot be overstressed, not only for blind flying but also for rapid manœuvring in clear air. Unfortunately, a gyroscope precesses, wanders in azimuth, and must be corrected every few minutes by reference to a magnetic compass. For fifteen years manufacturers have been trying to produce a gyroscope which can be automatically controlled by a magnetic compass. Their first problem was to find a way for the magnetic needle to act on the gyroscope. The difficulty is that the magnetic needle plays tricks during turns and is continually hunting, even if only slightly, owing to accelerations of the aeroplane. At what moment is the gyroscope to be corrected by the magnetic needle? The human eye can estimate when the needle is in the middle of a swing, but an automatic device must take its correction from the needle at fixed intervals of time, irrespective of whether the needle is out of truth at that moment.

There is the cathode-ray compass and magnetic dip indicator, on which research work is being carried out by Hughes.

The lines of equal dip in the Atlantic happen to lie nearly along the flight route, and if an instrument could be perfected to read accurately the amount of dip, aircraft could find their way across by following the line of equal dip.

The ideal instrument may be a master compass able to operate three dials at a distance, one for each pilot and one for the navigator. The master instrument can then be placed in the best situation in the plane where the magnetic needle, if it has one, will be less affected by electrical or other disturbance. If absolutely reliable and not too heavy, it will be the answer to the pilot's prayer.

## WORLD'S MOST POWERFUL AIR-COOLED ENGINE



**A 2,000 h.p. radial : The first photographs released of the Wright Duplex Cyclone, an eighteen-cylinder two-row radial which is stated by the makers to deliver 2,000 h.p. This unit thus becomes the most powerful air-cooled aero-engine in the world. A specially finished version is being displayed in the New York World's Fair. Two Duplex Cyclones are fitted in the new Consolidated 52-passenger flying-boat illustrated in *Flight* recently.**

# A "PAGE"

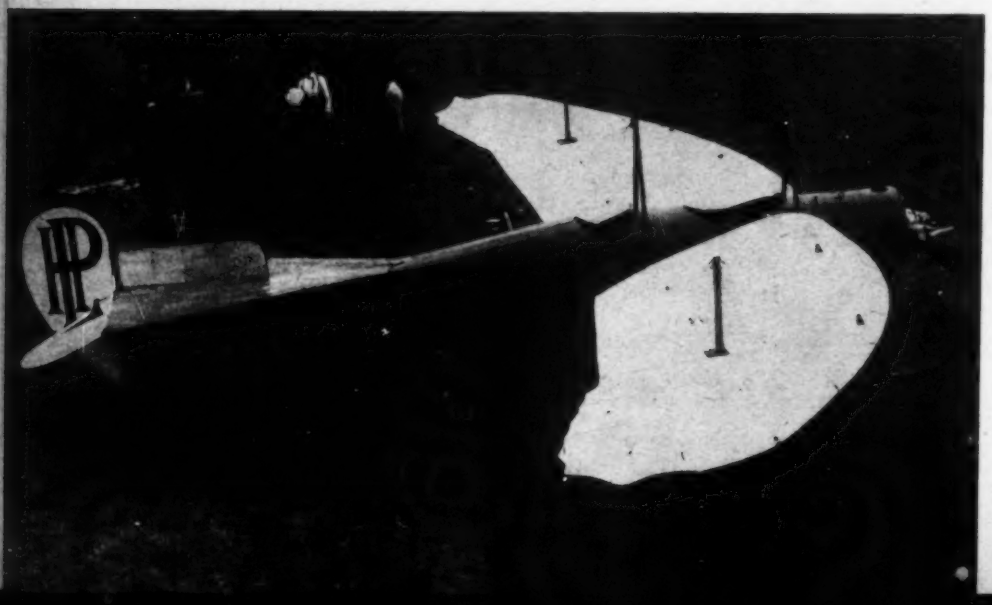
The picture above, showing Handley Page monoplane No. 2, built in 1911, affords an interesting contrast with the photograph of the latest Hampden bomber on the right. The crescent-shaped plan form of "No. 2," and its upturned wing-tip trailing edges, were designed to give inherent stability. The engine was a 35 h.p. Green four-cylinder water-cooled. Inset shows "H. P." looking not too worried after 30 years' struggle with Air Ministry officials.

"ADJOINING the new factory which Messrs. Handley Page, Ltd., now occupy at Creekmouth, Barking, the firm have a very convenient flying ground. It is about 2½ miles long by about a mile wide, and is situated between Barking and Dagenham Stations on the L.T. and S. Railway. A flat part of the ground is being levelled for starting purposes, and an artificial hill is available for gliding experiments."

It will be no use for any *Flight* reader to rush off to Barking to see the new Handley Page aerodrome there; he will not find it, even if he succeeds in identifying the "L.T. and S. Railway." The Barking factory and aerodrome referred to were the original ones owned by the firm in 1909, and the opening passages above were taken from *Flight* of August 21 of that year.

Handley Page, Ltd., was formed on June 17, 1909, as a limited company, although Mr. Frederick Handley Page himself had been interested in aeronautics for some years before that date. Originally an electrical engineer, he became attracted to flying by reading of what was being done in America by the Wright brothers, and by other experimenters in Europe. As was to be expected, his early ideas were not very firmly formed, and he was equally interested in all the different forms of flight. In fact, one of his early models was a sort of wing-flapping box kite. It was not long, however, before he decided that the aeroplane was the type showing most promise. He studied the work of Jose Weiss, a painter who became keenly interested in flying and who produced a number of bird-like gliders, although it is not clear whether because of their æsthetic appeal or on account of aerodynamic reasoning.

It would seem that Mr. Handley Page was influenced by the work of Weiss at least to this extent that his earliest aeroplanes shared with them the back-swept wings and washed-out angle of incidence which added so much to their stability during a period when most other designers were content to get their machines to fly and did not worry much about whether they were stable or not. And it is certainly something more than mere coincidence that the name of Handley Page has been associated so closely with safety features; first the inherently stable aeroplane, and afterwards the slot and slotted aileron.

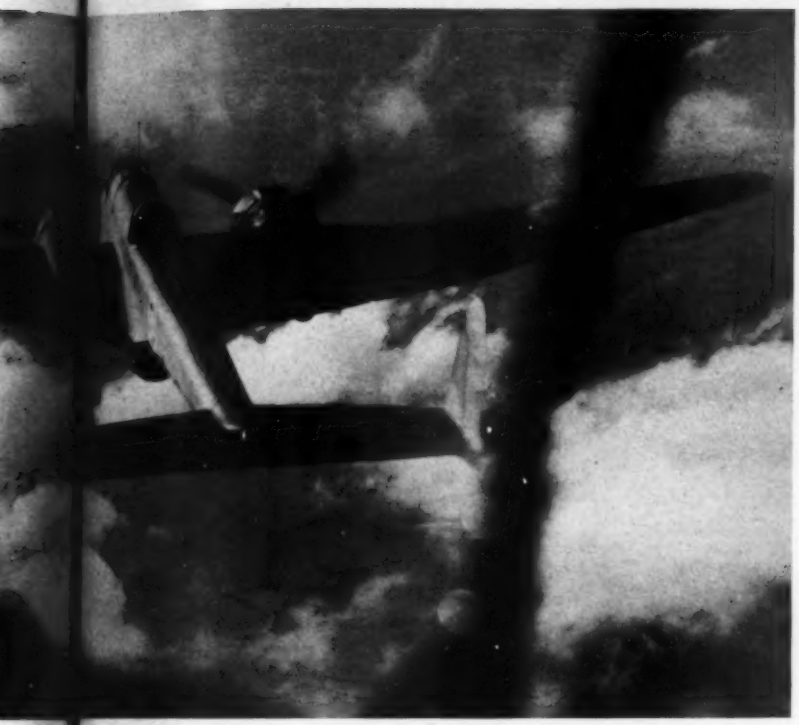



The third Handley Page monoplane, known as "The Yellow Peril," retained the crescent-shaped wings. It had a 50 h.p. Gnome Rotary engine and carried pilot and passenger.

# of HISTORY

## *How a Name became World-famous: Thirty Years of Handley Page, Ltd.*

*(Illustrated mainly with "Flight" photographs.)*



That Mr. Handley Page was not content to copy was shown by the fact that although his first monoplane, exhibited at the Olympia Aero Show of 1910, had back-swept wings, he did not do away with the tail, as had Weiss in many of his gliders. There was a tail, even if it was but a small one and of the "cruciform" type, pivoted on a single joint. With a four-cylinder engine of about 20 h.p., the machine did little more than short, straight hops. The need for lightness was evidently fully appreciated, for the machine weighed but 300 lb. empty and 450 lb. loaded. The wing area was 150 sq. ft. and the span 30ft. An interesting feature was the undercarriage, which had the central skid so popular at that time, but the springing of which was provided by the axle. The latter was of laminated wood and carried the wheels on its ends, cantilever fashion.

Early in 1910 Mr. Handley Page added lecturing to his other activities by giving a series of talks to students at the Northampton Polytechnic Institute at Clerkenwell. Perhaps it is this early connection with the Northampton which has prompted Mr. Handley Page to stipulate that his apprentices shall obtain some at least of their technical training there. For some years Mr. Handley Page was in charge of aeronautical engineering and laid out the aeronautical laboratory, which must have been one of the first.

### An Early Monocoque

At the Olympia Aero Show of March, 1911, Handley Page exhibited a very pretty little monoplane fitted with 35 h.p. Green four-cylinder in-line water-cooled engine. The rear portion of the fuselage was a beautifully finished mahogany *monocoque*, and for the rest the machine was characterised by the crescent-shaped plan form with upturned wing-tip trailing edges. Control was by wheel only, the wings being warped by moving the wheel from side to side and the rudder by turning the wheel. The laminated ash axle springing of the first machine was retained. The machine was entered for the Circuit of Britain held in July, when it was to have been fitted with an Isaacson radial engine, but did not start in the race.

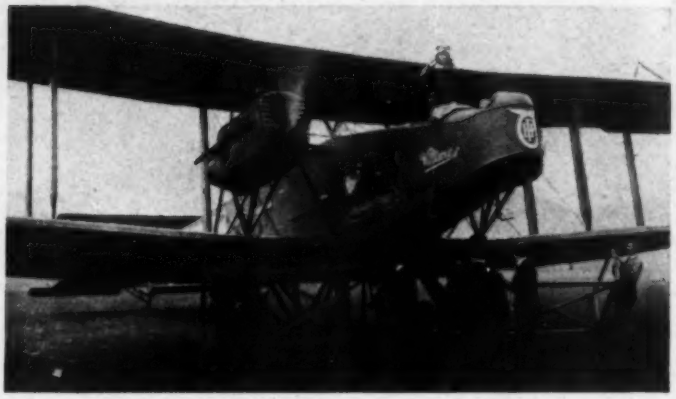
Monoplane No. 2, if it did not achieve any great success, taught the designer a great deal, and the experience accumulated was incorporated in a third monoplane, which later acquired the distinction of a nickname, "The Yellow Peril." With a 50 h.p. Gnome rotary engine the machine had quite a good performance, and the crescent-shaped wing, with its wash-out and graded camber, did undoubtedly give it a considerable degree of inherent stability, a fact which was repeatedly demonstrated by the pilot flying hands-off.

**The first Handley Page biplane, produced in 1913, also had the familiar H.P. plan form. In the upper picture on the right it is seen flying without a tailplane by way of demonstrating that this was unnecessary.**

**Known as the O/400, the large bomber on the right laid the real foundation of the greatness of the house of Handley Page. It had two 350 h.p. Rolls-Royce Eagle engines.**

Known as the V/1500, this large four-engined bomber (left) was designed for raids on Berlin, but was finished too late to take part in the war.

After the war, a number of O/400 bombers were converted into commercial aeroplanes. One of the first of these is shown below.



The great aeronautical event of 1912 was the competition known as the Military Trials held on Salisbury Plain for prizes offered by the Government. The Handley-Page Company designed and built a machine for the competition, but lateness in completing it, plus a wing damaged shortly before the trials, kept it out of the competition. The Military Trials monoplane was a much larger machine than "The Yellow Peril." For one thing, the pilot and passenger (there were no air gunners in those days) sat side by side, an arrangement which required a much wider fuselage than the tandem arrangement of the earlier machine. The engine was a 70 h.p. Gnome rotary.

That those early machines were *stable* there was no denying, as already mentioned, but they demanded a flying technique of their own. Pilots not accustomed to them were apt to do too much controlling instead of leaving the machines to "wallow" slightly and right themselves, as they always would. This fact probably accounted for the experience of Lieut. Parke, R.N., on a flight from Hendon to Brooklands on a hot, bumpy summer's day. When he landed at Brooklands the perspiration was pouring down his face and dripping from his chin, and as he jumped out of the machine he exclaimed: "Well, there wasn't much adjectival automaticity on this trip!"

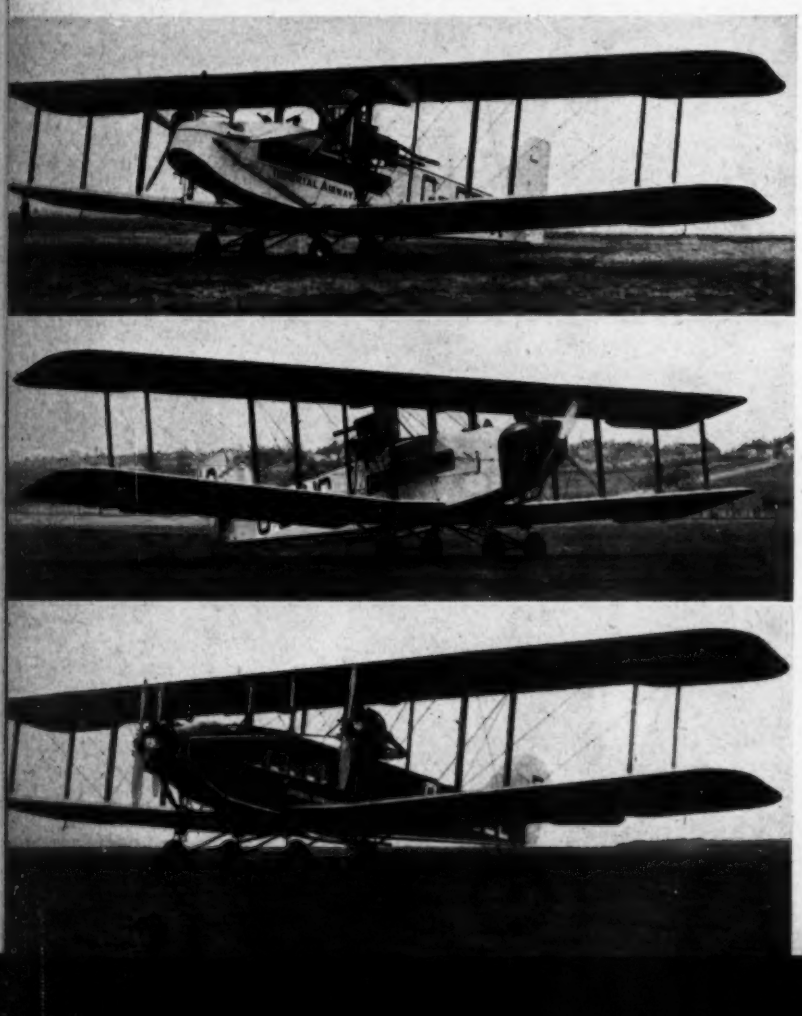
The present Editor of *Flight* has a very particular interest in the 70 h.p. Handley-Page monoplane, for on a certain day in December he arrived at Hendon to go as a passenger with Lieut. Parke, as previously arranged. He was, however, late, and was told that the aeroplane had set out for Oxford. Half an hour later news came through that the machine had crashed on Wembley golf course and that Lieut. Wilfred Parke and his passenger, Mr. Arkell Hardwick, manager of Handley-Page, Ltd., were both dead. Engine trouble was probably the initial cause.

It was in 1912, also, that the Handley-Page firm gave up the aerodrome at Fairlop, whither they had moved from Barking, and established works at Cricklewood.

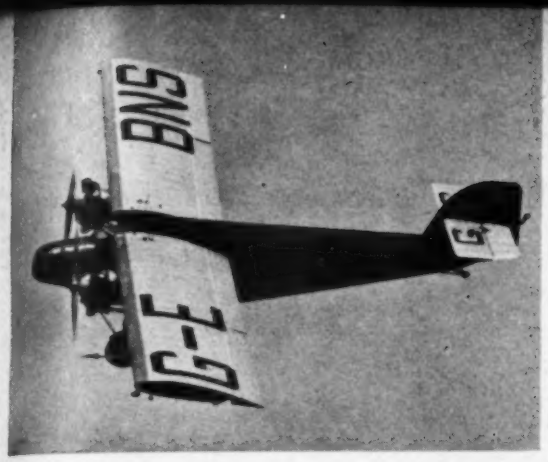
In 1913 the first Handley-Page biplane was produced. At that time monoplanes were under a cloud as a result of certain wing breakages which had occurred (though not on Handley-Page products), and probably this fact influenced "H.-P." in designing the biplane. The crescent-shaped plan form was retained, and the upper wing had a greater span than the lower. Ailerons were fitted (to the upper wing only) in place of the wing-warping used on the monoplanes, and were upturned, as had been the fixed tips of the monoplanes. At that time Handley-Page, Ltd., were building B.E. biplanes of Royal Aircraft Factory design for the Government, and the fittings used in the Handley-Page biplane were nearly all B.E. items. There, however, the similarity ceased.

In the meantime Mr. (now Sqn. Ldr., retired) E. R. Whitehouse had joined the firm as test pilot and chief instructor at the Handley-Page school at Hendon. He had done a great deal of flying on the 50 h.p. monoplane and did the testing of the biplane, winning favourable comment for his handling of it. The machine was fitted with a 100 h.p. Anzani engine and was ultimately acquired by Mr. W. Rowland Ding, who afterwards flew it a good deal. On the outbreak of war it was sold to the Royal Naval Air Service. It had a speed of about 73 m.p.h. At one period of its existence the biplane had its tailplane removed to demonstrate that it was so stable that a tailplane was not needed.

Before the war Mr. Handley-Page had



Three stages in the evolution of commercial aircraft. The upper picture shows the W.8B; in the centre is the W.8F; and in the lower picture the Hampstead.



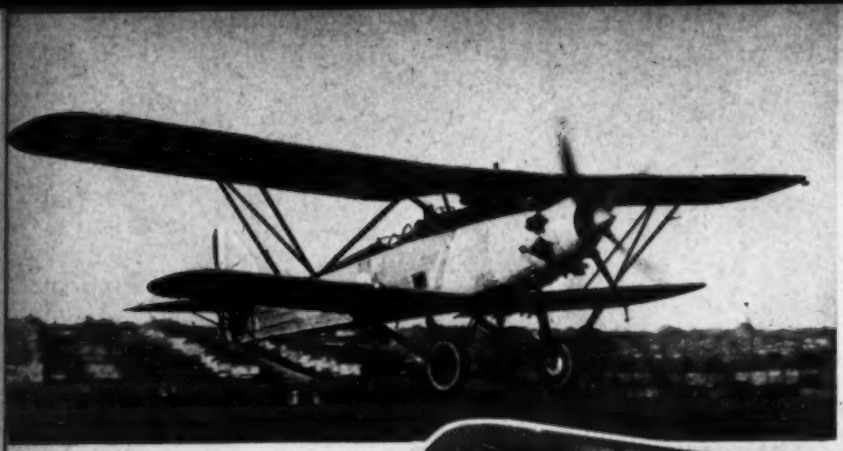

The Hamlet light commercial monoplane (left) could have one, two or three engines. It is seen here with two Siddeley Lynxes.

Right — The first of eight H.P. 42s supplied to Imperial Airways, who ordered the machines "off the drawing board." The "42" will go down in aviation history as a really outstanding aeroplane.

examined theoretically and on the drawing-board the merits of the large aeroplane. He came to the conclusion that there were considerable advantages in size, compared with the relatively tiny aircraft in existence at that time, but even after the outbreak of war it was difficult to convince the authorities that a large aeroplane could have military advantages not possessed by small machines. It must be remembered that bombing, when practised at all, was of a crude nature; it consisted of dropping a few hand grenades overboard in the hope that they would hit something. Of the carrying of large bombs no one had any experience. However, Mr. Handley Page succeeded in persuading Admiral Sir Murray Sueter, head of the R.N.A.S. at the Admiralty, that the large aeroplane was worth developing ("H.P." was ever a convincing talker!) and in December, 1914, the firm was given instruction to proceed with design. A whole year was spent in concentrated hard work (remember, there was no previous experience upon which to draw), and on December 18, 1915, the first Handley Page twin-engined biplane and the largest aeroplane ever built in this country up till then, made its first flight. It was transported from the Cricklewood works to Hendon aerodrome at dead of night, and to get it into the aerodrome many feet of fencing had to be removed.

Contrary to general belief, the first Handley Page twin-engined biplane was not the O/400. That type designation did not come until afterwards. The first was known as the O/100, and the type continued under that designation until the end of 1917, when a slightly modified type became known as the O/400. A great many were built and used in raids from Dunkirk. A story was told of one of the very first of the Handley Page twin-engined biplanes: The British pilot was on his way to deliver it to a British aerodrome in France, but lost his way somewhat and landed on what turned out to be, to his great surprise, a *German* aerodrome. It is said that a few days later the Germans dropped a note on a British aerodrome expressing thanks for the safe delivery of the new aeroplane.

On the right is the Hanley torpedo machine, showing the extensive application of Handley Page slots. Below, on the left, is the unorthodox general-purpose monoplane (Bristol Pegasus) produced a few years ago. The original Harrow (bottom right) was a torpedo machine, and should not be confused with the big twin-engined bomber now used by the R.A.F.



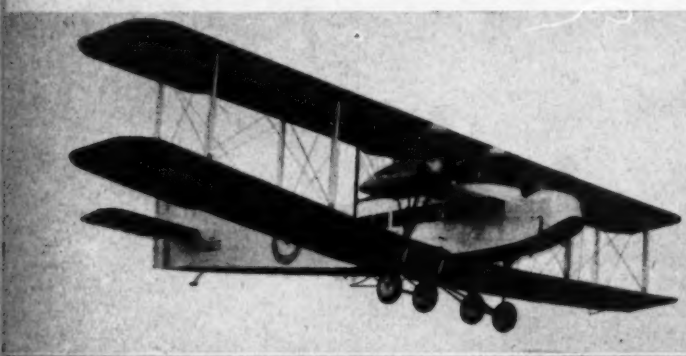
One version of the Handley-Page Hare bomber was fitted with a geared Bristol Jupiter, as shown on the left.

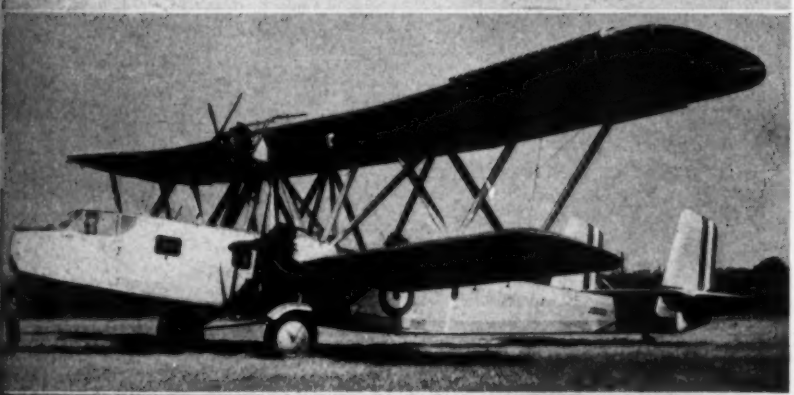
Below is the Hare with a Siddeley Panther. It will be noted that torpedo crutches are fitted.

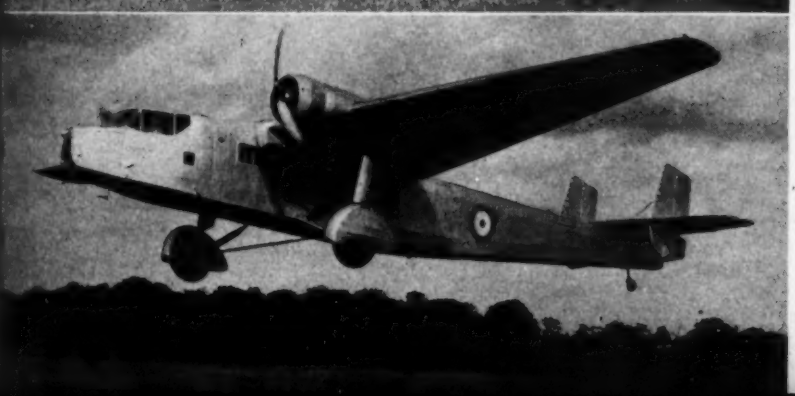
The O/100 and O/400 biplanes were used extensively for night raids on Rhineland towns, but their range was not sufficient to make possible raids on Berlin. With this objective in mind an even larger type, known as the V/1500, was put in hand and was far and away the most ambitious project of its day. The first machine was built in great secrecy (components were manufactured in Belfast by Harland and Wolf) and made its first test flight in May, 1918. It was crashed in the following month, so that there was a further delay in going into production. A total of 255 had been ordered, but by the time the Armistice came in November, 1918, only three were ready for the raid on Berlin, which never took place.

Some idea of the daring of these designs can be gathered from their dimensions and other data. The O/400 had an upper-wing span of 100ft., and an empty weight of 8,200 lb. The loaded weight was 14,000 lb., which does not sound much nowadays, but was considered very bold then. With 300 gallons of petrol (about 2,400 lb.) the machine had a duration of six to seven hours at a cruising speed of about 70 m.p.h., and carried a military load of 2,800 lb. When it is remembered that power was supplied by two Rolls-Royce Eagle engines of 350 h.p. each, this performance is by no means bad. The military load represented 4 lb./h.p.

Even more impressive were the figures for the V/1500. With four Eagle engines, arranged in tandem pairs in the gap between the wings, this machine had a wing span of 126ft., and weighed 16,000 lb. empty and 28,000 lb. loaded. Its cruising speed was 75 m.p.h. and its duration about 8 hours with a military load of 6,600 lb.







## *Commercial Aviation*

From the beginning Mr. Handley-Page had never doubted the ultimate triumph of the large aeroplane as a peaceful carrier of passengers, mails and freight, and as soon as civil aviation was given its freedom after the war, Handley-Page, Ltd., converted O/400 military aeroplanes into commercial aircraft. A subsidiary company, Handley-Page Transport, Ltd., was formed, and commercial flying was inaugurated in August, 1919, when a Cricklewood-Paris service started. This was followed in September by a London-Brussels service, and the next year by a London-Amsterdam service. After a time, the competition of foreign Government-subsidised air lines became so intense that Handley-Page Transport, Ltd., had to cease operations. After a long delay—in 1921, to be exact—the Government decided to grant subsidies to air traffic companies, and Handley-Page Transport, Ltd., resumed operations.

Bomber Transport Trio : From top to bottom are the Clive (two Bristol Jupiters) ; the H.P. 43 (three Bristol Pegasus) ; and the H.P. 51 (two Siddeley Tigers). The last-named machine was, in effect, the prototype of the Harrow bomber.

# THE EXECUTIVE STAFF: DIRECTORS of the H. P. ORGANISATION

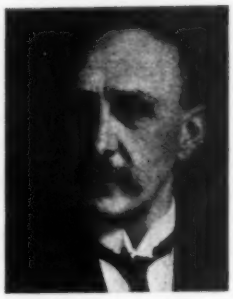
Mr. F. HANDLEY PAGE, managing director.

Wing Cdr. Sir LOUIS GREIG, director.

Mr. D. F. SUTHERLAND, director.

Mr. J. HAMILTON, director and works manager.

Mr. E. A. EASY, director and secretary.



Mr. S. R. WORLEY, chairman.

How it ultimately became absorbed in Imperial Airways was recorded in *Flight* last week.

The first aeroplane to be built after the war by Handley Page, Ltd., specifically for civil flying was the W.8, a biplane with some resemblance to the O/400, but with two 450 h.p. Napier Lion engines mounted in the wing gap. This machine had accommodation for 15 to 20 passengers and cruised at 90 m.p.h. The W.8 first appeared in December of 1919. In the following year it lifted a useful load of 3,690 lb. to a height of 14,000ft., piloted by Capt. (now Professor) G. T. R. Hill, thereby establishing a record.

Handley Page, Ltd., were closely concerned, in 1920, in the huge deal whereby 10,000 aeroplanes and 35,000 aero engines were taken over from the Aircraft Disposal Department of the Air Ministry by a syndicate known as the Aircraft Disposal Co., Ltd.

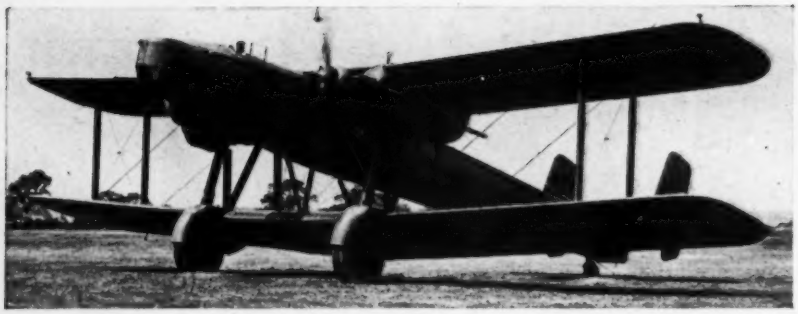
In 1920 the Air Ministry organised a competition for commercial aeroplanes. The trials were carried out at Martlesham Heath and Felixstowe (for amphibians). Handley Page, Ltd., entered a W.8 in the class for large commercial aeroplanes and won the second prize, the first not being awarded.

The development of Handley Page transport machines was continued with the three-engined W.8F. Essentially this was a modification of the W.8B but was powered with one Rolls-Royce Eagle IX in the nose of the fuselage and a pair of Siddeley Pumas on peculiar inter-plane mountings designed to keep the engines as close to the struts as possible by allowing them to be tilted out of the vertical. The W.8F accentuated security against engine failure and had, moreover, a comfortable cabin supplied with warm air taken from muffs over the exhaust pipes of the nose engine. At a loaded weight of 12,000 lb. the top speed was about 102 m.p.h.

The W.8F was eventually named the Hamilton and machines of the type were supplied to Belgium for use in the Congo. By 1927 the triple-engined theme had been further developed in the W.9, or Hampstead, which was likewise a derivation of the W.8 but was fitted with three Siddeley Jaguars or Bristol Jupiters. Full loaded, the machine would fly on any two engines.

The twin-engined layout was not, however, abandoned. The next type, the W.10, had a pair of Napier Lions. Four of these machines were supplied to Imperial Airways with cabins equipped like that of the Hampstead, i.e., having fourteen passenger seats. At full throttle near the ground a top speed of 112 m.p.h. was obtainable, the landing speed being as low as 45 m.p.h. and the initial rate of climb 700ft./min.

**The Hyderabad bomber shown in the upper picture was a development of the W.8 and had Napier Lion engines. On the right is a further development, the Hinaidi, with two Bristol Jupiters.**



Of unusual conception was the Heyford—two Rolls-Royce F (Kestrel) engines—with its fuselage placed directly under the top wing.

## THREE H. P. TECHNICAL CHIEFS

Mr. G. R. VOLKERT, echnical and production chief

Mr. J. W. RATCLIFFE, chief draughtsman.

Mr. R. S. STAFFORD, head of aerodynamics section

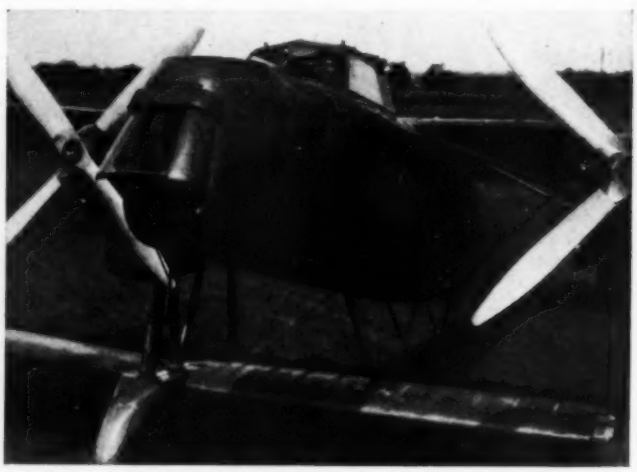
On entirely different lines the company next designed the Hamlet, a comparatively small high-wing monoplane which could be fitted with two Siddeley Lynx engines, three Siddeley Mongoose, three Bristol Lucifers, or a single Bristol Jupiter. From four to six passengers could be accommodated in addition to the pilot and (American designers please note!) the machine incorporated a complete Handley Page slot and flap installation.

By this time designers were becoming really comfort-conscious and the Hamlet was provided with folding tables in the cabin, electric interior lighting, flight instruments for the information of passengers, a clock, stowage for personal luggage and a supply of drinking water. The twin-Lynx installation gave a top speed of 114 m.p.h. at a loaded weight of 5,000 lb.

In 1929, with exemplary courage and foresight, Imperial Airways placed an order for eight very large Handley Page airliners which were quite revolutionary in their conception. These were the well-beloved "42s," one of which (*Heracles*) had, by November last year, flown more than 1,250,000 miles, during which not one of her 95,000 passengers suffered the slightest injury. On an average this grand old liner had carried more than 13,500 passengers a year, or 37 a day.

At the time of its introduction the type 42 caused a stir not only because of its size (span 135ft.) but due to the exceptional comfort of its spacious interior, the low noise level in the cabins, the unusual arrangement of its four Bristol Jupiter geared and supercharged engines and its docility as a flying machine.

The type 42 was supplied in two versions, one for the eastern section of the England-India route and one for the western section and European use. Up to 38 passengers could be accommodated and the machines



The Heyford, Mark II, had Kestrel VI engines in streamlined nacelles, and an enclosed cockpit for the pilot.

Mr. H. SMITH, works supt., Cricklewood.

Mr. W. H. MacROSTIE, works supt., Radlett.

## RESPONSIBLE FOR OUTPUT

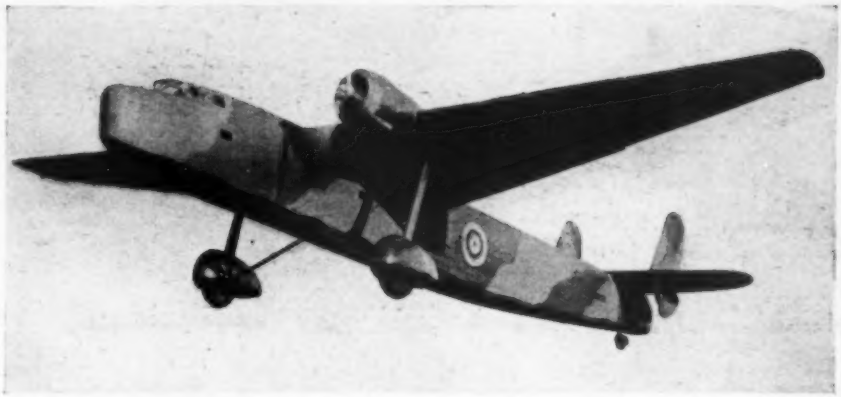
**One of the outstanding characteristics of the Handley Page works is the high rate of output. For this the six men whose portraits are shown here are largely responsible.**

Mr. D. ROBINSON, assist. works supt., Cricklewood.

Mr. W. E. SALMON, supt. experimental shops.

Mr. W. A. ROBINSON, chief inspector.

Mr. W. TAYLOR, maintenance engineer.



An early Expansion type, the Harrow Mark I bomber was fitted with Pegasus X engines and Mark II with Pegasus XXs.

would cruise at 95-105 m.p.h. The landing speed was as low as 51 m.p.h.

All-metal construction was used for the 42s, the covering of the wings and the rear portion of the fuselage being fabric, though the front part, embodying the pilot's cabin and passenger saloons, was metal-skinned.

Although earlier Handley Page transports weighing much less had been fitted with four main landing wheels, the 42 had only two wheels and a swivelling tail wheel, the main wheels being fitted with 60 x 21in. tyres. Despite its immense size and the height of the landing wheels, the machine was planned so that passengers could enter or leave the cabin without using steps.

Handley Page slots and slotted ailerons were naturally fitted.

Preoccupation with orders for military machines has prevented the company building any subsequent transport aircraft, but one has only to look at the Hampden bomber to visualise the firm's ability to produce civil types.

Major J. B. CORDES, chief test pilot.

Flt. Lt. J. R. TALBOT, second test pilot.

## THE FLYING TEAM

Parallel with its civil developments the company produced a series of outstandingly interesting military types, chiefly bombers and torpedo-carriers.

Tests with the Handley Page slotted wing shortly after the war were so successful that the Air Ministry ordered a torpedo-carrying shipplane known as the Hanley. Arranged as a three-bay biplane, the Hanley was a single-seater with manually worked slots all along the leading edges of upper and lower wings. The split undercarriage was arranged to give a large ground angle to allow for the stalling angle. A development of the Hanley was arranged as a two-seater and was called the Hendon. This machine was a two-seater, also with a Napier Lion, and weighed 6,900 lb, fully loaded. The speed range was from 45 m.p.h. to 110 m.p.h. and the service ceiling was 10,000ft.

By 1927 a new type of torpedo-carrier, known as the Harrow, had been evolved. This machine, which took advantage of the increased power offered by the Napier Lion XI, was a two-bay machine of clean design. In its Mark II form it had a sharp dihedral angle on its upper wing. The wing structure was of wood, as was the rear portion of the fuselage, though the front part was of steel. The wings were fitted with two varieties of automatic slots, one giving lateral stability and control at low speeds and the other, interconnected with the slotted ailerons, functioning as lift slots. As a landplane the Harrow II was capable of a top speed of 126 m.p.h. and a ceiling of 15,300 ft.

The next Handley Page to be fitted for torpedo carrying was the Hare, though this machine was intended primarily as a day bomber. It was characterised by the sesquiplane layout of the wings, by the rigid interplane bracing and by the peculiar bracing of the split undercarriage, permitting the release of a torpedo or a large bomb. A cross-axle undercarriage was also designed. The Hare appeared with a geared Bristol Jupiter engine and with a Siddeley Panther, which was at that time known as the Jaguar Major. The top speed was over 140 m.p.h. and the ceiling more than 14,000 ft.

To the M.1/30 specification issued by the Air Ministry Handley Pages designed a somewhat unusual biplane with a Rolls-Royce Buzzard engine. Features were the placing of the fuselage immediately under the top wing and the duplication of the main landing wheels.

It is not generally realised that the company built a remarkably interesting little single-seater fighter for the U.S. Navy. This was a neat low-wing cantilever monoplane with a 230 h.p. Bentley rotary engine and had a top speed of 146 m.p.h. near the ground with an initial rate of climb of 1,800 ft./min. Leading-edge slots and slotted "drooping" ailerons gave a landing speed of 44 m.p.h. despite the wing loading of 18 lb./sq. ft. Two synchronised machine guns were installed in the top cowling. To facilitate stowage on shipboard the rear half of the fuselage could be completely detached by unscrewing half a dozen bolts.

This little monoplane was actually the only specialised

Group Capt. R. B. MAYCOCK, sales manager.

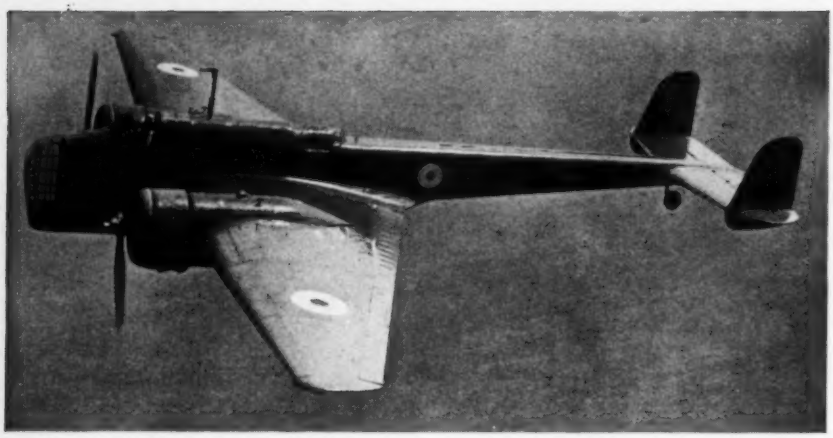
Major R. E. NICOLL, sales staff.

Mr. G. C. D. RUSSELL, sales staff.

Mr. W. ROSE, accountant.

## ON THE BUSINESS SIDE

— which does not imply that the other departments are unbusinesslike!



**Breaking new ground : The Handley Page Hampden, prototype.**

fighter ever built by the Handley Page company, though the Type 47 general purpose monoplane which appeared in 1935 could, due to its peculiar design and high performance characteristics, function efficiently as a two-seater fighter.

The most striking feature of this low-wing cantilever monoplane was the "waisted" fuselage which, aft of the gunner's cockpit became a circular boom to carry the tail, which was also unconventional in layout in that the fin and rudder were placed ahead of the elevator. Stressed skin construction was employed and the engine was a Bristol Pegasus III, giving a maximum output of 750 h.p. The wide split undercarriage permitted the carrying of a torpedo and optional equipment included desert rations and spares, stretchers, army co-operation gear or special long-range tanks. A crew of three could be carried.

### *Troop Carriers*

Apart from the specialised bombers (description of which is purposely being deferred until the end of this account) H.P.'s have produced three types of bomber transport (troop carrier) machines. The first of these was the Clive (*circa* 1929) which resembled externally the twin-engined transport biplanes and, for that matter, contemporary Handley Page bombers. The Clive was, in fact, generally similar to the Hinaidi and had two Bristol Jupiter geared engines. It had seating for 17 fully armed soldiers and the cabin equipment included rifle racks. Scarff gun rings were fitted in the nose and aft of the wings.

The H.P. 43 bomber transport is of special interest for two reasons: firstly, because its biplane wing structure resembled that of the four-engined machines for Imperial Airways and secondly, because, as will be explained, it was indirectly connected with the development of the Harrow monoplane bomber. The three geared Pegasus engines were arranged following "42" practice though the top wing bore only one engine instead of two. Thirty fully armed troops could be carried in addition to a crew of five. There were gun rings in the extreme nose and the extreme tail.

After tests the machine was developed into the H.P. 51, which retained the same fuselage and a similar tail, but differed in that it had a monoplane wing, tapering sharply in chord and thickness, and fitted with slots and slotted flaps. The engines in this revised prototype were Siddeley Tigers, though units of the Pegasus series were eventually substituted, giving the machine an even closer resemblance to the Harrow bomber which followed it.

It is of interest to observe that whereas the biplane wing cellule spanned 114 ft. the monoplane wing measured only 90 ft.

It is for their bombing aircraft that the Handley Page company are chiefly famed and it is fitting that this review should conclude with an outline of the development of Handley Page bombers from the Hyderabad up to that Hampden of to-day.

The Hyderabad, which was supplied in quantity to the R.A.F., was a military development of the W.8 and was fitted with two Napier Lion engines. In addition to machine guns on Scarff mountings in the nose and aft of the wings there was a third weapon in the bottom of the fuselage. Bombs were carried externally under the lower wings.

The Hyderabad was the precursor of the Hinaidi, likewise a standard R.A.F. type, which resembled its forerunner in essentials, but was fitted with geared Bristol Jupiter engines either one of which would sustain it in flight. Like the Hyderabad, the Hinaidi was of wooden construction. It had a top speed of 114 m.p.h. and a ceiling of 11,300 ft. with the original geared Jupiters.

In 1926, after the appearance of the Hyderabad, the company produced a very large single-engined bomber

**Development : The production version of the Hampden, a bomber of outstanding merit.**

known as the Handcross and fitted with a 650 h.p. Rolls-Royce Condor. Bombs were carried beneath the fuselage in a fairing.

In 1930 announcement was made of a "hush-hush" bomber with two Rolls-Royce F (Kestrel) engines. The prototype was known as the H.P. 38, but a modified version was called the Heyford and was put into large-scale production for the R.A.F. The Heyford was unique in many respects. Its most striking characteristic was the placing of the fuselage directly under the top wing, leaving a large gap between the bottom of the fuselage and the thickened centre portion of the lower wing, in which were accommodated the bombs. The engines were placed high up under the top wing, permitting a very short undercarriage. In addition to machine guns in the nose and midway along the fuselage a third weapon was installed in a retractable rotating turret which soon became known as the "dustbin." Loaded to a weight of 15,500 lb. the Heyford was capable of over 140 m.p.h. It had a span of 75 ft. and a wing area of 1,470 sq. ft. An improved version, the Heyford Mark II, had the more powerful Kestrel VI engines in cleaned-up nacelles, an enclosed pilot's cockpit and a few other refinements.

At the outset of R.A.F. expansion an order was placed with the company for a large number of Harrow bombers of a type which, as already indicated, was developed from a bomber transport design.

Arranged as a high-wing cantilever monoplane with a fixed well faired undercarriage, the Harrow has been supplied to the R.A.F. in two forms, the Mark I version having medium supercharged Bristol Pegasus Xs and the Mark II fully supercharged Pegasus XXs. A crew of four or five is carried and there are power-driven gun turrets in the nose and tail in addition to a manually operated turret amidships. Bombs are carried internally.

The Harrow is a fine example of all round efficiency combining performance, ease of production, and serviceability. All the Harrows were delivered ahead of schedule and the company proceeded with the production of the Hampden, which ranks as one of the world's outstanding military aircraft.

The Hampden was developed from a prototype machine known as the H.P. 52. Despite its fine aerodynamic form the machine is very easy to build and during the past few months many scores have gone into service with the R.A.F.

Externally the Hampden is characterised by sharply tapered slotted and flapped wings and the peculiar formation of the fuselage which, at its forward end, is virtually a box containing all the load, the tail being carried on an extension which is really a boom of small cross section.

Four machine guns are fitted; of the two in the nose one is fixed and one is free while the upper and lower guns, farther aft in the fuselage, are on free, manually operated mountings. The Hampden is powered with two Bristol Pegasus XVIII engines which have two-speed superchargers conferring a top speed of 265 m.p.h. at 15,500 ft. Flying at its maximum permissible weight of 21,000 lb. the machine will carry a load of 3,587 lb. for 1,725 miles cruising at 212 m.p.h. Throttled back to 172 m.p.h. it will carry the same load for nearly 2,000 miles. Despite the fact that it is considerably smaller than the Harrow the Hampden transports a bigger military load for a longer distance at a much higher speed.

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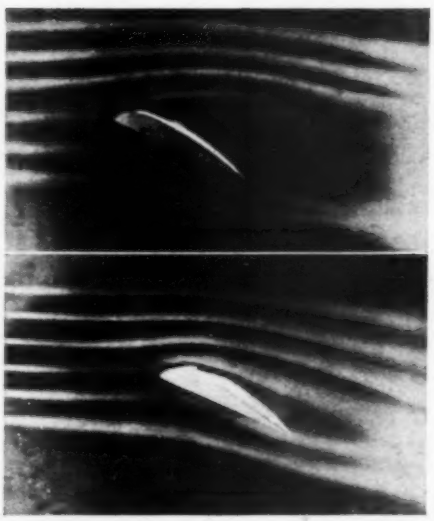
*A "Page" of History (Cont.)*

# IN SEARCH of SAFETY

## *The Story of the Handley Page Slot*

REFERENCE was made in an earlier section of this history of Handley Page, Ltd., to the fact that Mr. Handley Page has been, from the very beginning, an advocate of safety in flying. His earliest monoplanes were designed to have a considerable degree of inherent dynamic stability, although he realised full well that a certain amount of efficiency might, and probably would, have to be sacrificed for the sake of this safety feature.

During the war period every effort was concentrated on producing military aircraft of high performance and capable of carrying the largest possible military load over the maximum distance. Towards the end of the war, however, Mr. Handley Page again began to think of the safety aspect, probably with civil aviation prominently in mind, and the number of casualties due to stalling and spinning led him to ponder on ways and means of preventing the breakaway of the air at about 14 degrees of incidence.



**Action of the Handley Page slot: In the upper picture the slot is closed and the air is seen to break away. In the lower it is open and the "burbling" has disappeared**

His first idea was to cut slots in the wing, running in a fore-and-aft direction. Wind tunnel tests carried out in the Handley Page wind tunnel, which was probably the first privately owned in the country, indicated that some improvement might be expected, but that it was not likely to give the improvement needed to make any very marked difference.

In the course of trying out all sorts of devices in the wind tunnel it was discovered that if a small wing was placed ahead of, and close to, the leading edge of a large wing, "burbling," or the breakaway of the air, was delayed until a much greater angle was reached. The result was that the lift coefficient curve remained straight up to the greater angle, and a corresponding increase in maximum lift was attained.

It was some time in 1919 that this important discovery was made, and a number of patents were taken out, covering fixed slots and movable slots, single slots and multi-slots. By a curious instance of "great minds thinking alike" a German engineer, Dr. Gustav Lachmann, had been working along very similar lines and had arrived at similar solutions. For some years Dr. Lachmann and Handley Page, Ltd., worked together, although Dr. Lachmann remained in Germany. Then, some ten years ago, Dr. Lachmann came to England and joined the staff of the British company, where he has remained ever since, except for occasional visits to the United States.

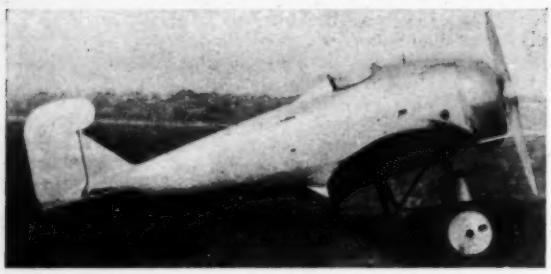
It is not without interest to place on record here the fact that during the first two or three years of slot development Handley Page, Ltd., tried out every conceivable type and arrangement of slot, and that many of these were patented, including some which have been revived by other designers, notably American, recently and, be it mentioned,

The machine used in the first slot demonstration was a D.H.9 with a fixed leading-edge slot on the upper wing.

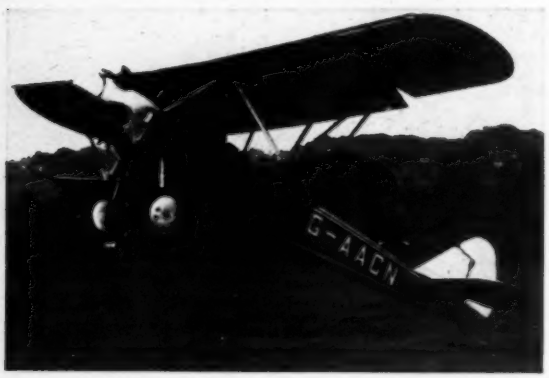
since the original Handley Page patents expired.

But to return to our story of the evolution of the slot. It was during 1920 that vague rumours of a "new Handley Page wing" began to circulate. In October of that year the first public demonstration of a slotted-wing aeroplane was given at the Handley Page aerodrome at Cricklewood. The machine used for the demonstration was a D.H.9 biplane with Siddeley Puma engine. The upper wing had a fixed leading-edge slot, but for the rest the machine was standard. This type of slot was, of course, intended solely to increase *lift* by postponing the stall. It also increased the drag, and to a greater extent even than the lift.

Space does not suffice for referring all the steps by which Handley Page, Ltd., evolved the slot and its different applications. But it may be mentioned that the following year, in 1921, the slotted flap was introduced. In this the hinged trailing edge of the wing was so arranged that when it was in the normal position the gap, or slot, between its leading edge and the rear edge of the main wing, was closed. When the trailing edge was deflected the slot was opened, and a very powerful circulation was introduced. Obviously this slotted trailing edge could be used either as a lift-increaser, by extending it over the whole span, or as a lateral control. In practice it was found best to divide it so that the outer portion became a slotted aileron and the inner portion a slotted flap. One great advantage of the slotted flap, not shared by most other types, is that at small angles of deflection the increase in drag is low. This makes the slotted flap useful for take-off as well as for landing.



Early lift slots and flaps on a Handley Page monoplane built for the American navy. The engine was a Bentley rotary.



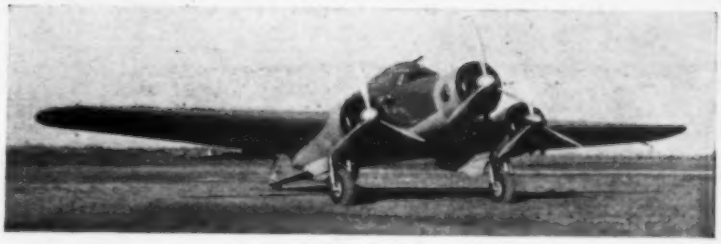

### *The Automatic Slot*

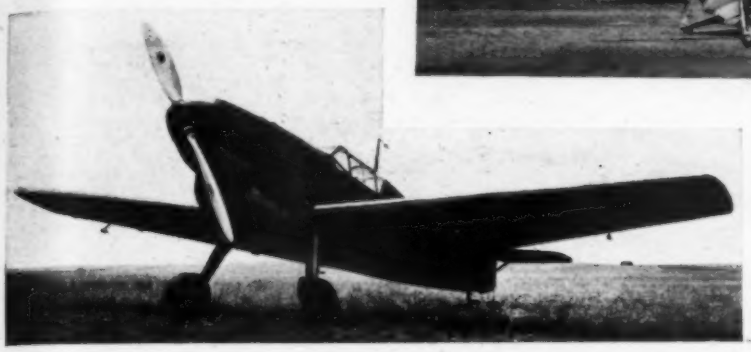
Following the introduction of the leading-edge slot and the slotted flap, some years were spent by the Handley Page technical department in evolving the best mechanism for operating the slots. Then, in 1927, came the automatic leading edge slot. This was introduced as a result of the discovery that when the wing reached a certain angle of incidence, the "slat," as the moving member of the slot is called, tended to move away from the main aerofoil. By arranging the linkage with suitable angles, the slot could be made to open at a predetermined angle of incidence. The obvious application was to fit the automatic slot over the outer wing portion only, near the wing tip, using it to make the wing stable at large angles of incidence and so ensuring that, although the aeroplane would

(Above)
Capt. Cordes demonstrating the Handley Page "Gugnunc," built for the American Guggenheim Competition. The machine failed to win because its minimum speed was 39.7 m.p.h. instead of the 38 m.p.h. stipulated !

(Right)
The application of slots and slotted flaps has been brought to a high degree of perfection in the Westland Lysander. The leading-edge slots are linked to the slotted flaps and operate them automatically.

German appreciation (below): The Messerschmitt Me. 109 fighter is fitted with Handley Page slots and flaps.
Italian appreciation (right): The Italian Savoia-Marchetti S.M. 79 would not be able to operate with its heavy load but for its slots and flaps.





stall, it would not "drop a wing" and go into a spin.

In 1929 the Americans organised a competition for safe aeroplanes. The sponsors were the Daniel Guggenheim fund, and the competition was known as the Guggenheim competition. Sixteen machines were entered, but in the end the competition turned into a fight between the Handley Page entry, which *Flight* had nicknamed the "Gugnunc," a name which has stuck to the type, and the machine entered by the Curtiss Company of America, the "Tanager." The Handley Page machine failed in the slow-speed test. This was not to exceed 38 m.p.h., and the "Gugnunc" averaged 39.7 m.p.h. The Curtiss "Tanager" was slotted and flapped liberally without any royalty having been paid to Handley Page, Ltd.

Recent slot development has been in the direction of lift slots and slotted flaps over the inner portion of wings, and automatic leading-edge slots and slotted ailerons over the outer. One of the most outstanding British examples of scientific application of "slottery" is the Westland Lysander monoplane, in which operation is entirely automatic, the leading-edge lift slots opening when a certain angle has been reached, and being linked with the flaps they pull these down at the right moment.

Abroad also great use has been made of slots and slotted flaps. An Italian and a German machine are illustrated as typical examples.

# BROOKLANDS AT HOME

RARELY does the social side of flying club life shine with such brilliance as it did last Sunday down Brooklands way. In spite of cold fronts with an accompaniment of low clouds, gusty winds and rain, an afternoon programme of flying was carried through with remarkably little delay.

The occasion was an At Home, coupled with an unusual competition between the four clubs in the Brooklands group. Several years ago Brooklands had won outright a magnificent trophy from the Doncaster Flying Club. Last year this trophy emerged from retirement when it was put up for competition between the four clubs, Brooklands, Cinque Ports, Northants and South Coast. However, its emergence was short lived, for Brooklands won again, but this year (to the delight of many and Mrs. Ann Davis in particular) the Cinque Ports men just managed to pip Brooklands.

For this competition each of the four clubs entered a team of three pilots, who were awarded points on their flying ability by Sqn Ldr. F. W. C. Shute. Marks were lost for taxi-ing straight across to the take-off point (instead of proceeding round the boundary); swinging on take-off; failing to look round before making climbing turns and spinning; and losing height and failing to open up the throttle in steep turns. Finally each competitor was asked to make a forced-landing approach to the aerodrome and put down his machine as near as possible to the circle before finally turning his machine broadside

After the practical side of the competition had been completed the pilots were checked up on their knowledge of navigational rules and pilotage by Mr. Robert Ashton, whose five questions called for a great deal of urgent thinking. Actually Brooklands were one point up on Lympne in the flying part of the competition, but the latter succeeded in passing them by 6.5 points when it came to answering the questions.

During the course of the afternoon guests of the Brooklands Club were entertained to a series of first-rate flying demonstrations. Kenneth Waller rolled, looped and stall-turned at low altitude a Tiger Moth, after which F/O. J. K. Quill shot out of the clouds to run through a quick programme of Spitfire aerobatics, including a remarkably tight turn inside the aerodrome boundary before climbing and rolling his way out of sight back into the clouds. Later the Hon. R. H. Dalrymple put the little single-seater Chiltern through its paces. Finally, Flt. Lt. Lucas gave a convincing demonstration in the Hawker Company's civil-registered Hurricane.

During the tea interval the lads of the Brooklands squadron of the A.D.C.C. fought several rounds with the gloves in a quickly erected ring. We noticed, incidentally, that two very small cadets were obviously more air-minded, and while everyone was watching the boxing, they proceeded to test the A.S.I. of a visiting aircraft—one blowing down the pitot tube until purple in the face while the other checked up on the indicated speed.

Shortly after the result of the competition had been announced and Mrs. Duncan Davis had presented the Doncaster Trophy to Mrs. Ann Davis, the anticipated cold front arrived according to schedule. However, the downpour was short-lived and the party adjourned by road to Mr. Arthur Woods' beautiful house and grounds at Byfleet.

**Four-club Contest Result**

| | Theory. | Practice. | Total. |
|---|---|---|---|
| CINQUE PORTS FLYING CLUB | | | |
| G. F. Bryan | 8 | 78 | 86 |
| R. Cockburn | 10 | 86 | 96 |
| E. Symmons | 8.5 | 89 | 97.5 |
| | | | 279.5 |
| BROOKLANDS FLYING CLUB | | | |
| H. Hordern | 6 | 88 | 94 |
| C. I. Randrup | 7.5 | 84 | 91.5 |
| C. Brown | 6.5 | 82 | 88.5 |
| | | | 274 |
| SOUTH COAST FLYING CLUB | | | |
| L. Cornelius | 1 | 80 | 81 |
| J. White | 6 | 72 | 78 |
| A. E. Farnfield | 5 | 85 | 90 |
| | | | 249 |
| NORTHAMPTONSHIRE FLYING CLUB | | | |
| G. Linnell | 7 | 86 | 93 |
| A. J. Spiller | 3.5 | 60 | 63.5 |
| J. F. Wood | 4.5 | 60 | 64.5 |
| | | | 221 |

## *Capt. Mark Diamant's G.A.P.A.N. Post*

IT is announced that Capt. Mark Diamant has been appointed as the new general secretary of the Guild of Air Pilots and Navigators.

He has been associated with the work of the Guild almost since its inception. He was a war-time pilot, and was for some five years the manager of the aviation department of the Dominion Motor Spirit Co. Capt. Diamant is well known in the flying club world and is, if we remember correctly, actually a member of some dozens of clubs all over the country.

# CELEBRATING the THIRTIETH

## *The Handley Page Banquet*

FOR an aeronautical company to attain the age of thirty is something of an event. In the case of Handley Page, Ltd., the event was duly celebrated, first on the actual day, June 17, when nearly 5,000 employees emigrated in eight trains to Portsmouth, and again on Monday last, June 19, when the firm gave a banquet at Grosvenor House to hundreds of old friends in the British aircraft world.

Speeches at the latter function were made by Sir Kingsley Wood, Secretary of State for Air; Lord Londonderry, former Secretary of State for Air; Mr. S. R. Worley, chairman of the company; Mr. F. Handley Page, managing director of the company; Rear Admiral Sir Murray Sueter, M.P.; and Lt. Col. Moore-Brabazon, M.P.

Sir Kingsley Wood referred to the fact that Handley Page, Ltd., was one of the pioneer firms, and that its history was something of a miracle. During the last war the firm made a great contribution to the country's air power, and Mr. Handley Page might be said to have been the father of the heavy bomber throughout the world. By introducing the slot Mr. Handley Page had added greatly to the safety of flying, and it was not only in military aviation but also in commercial flying that Handley Page aeroplanes had made their mark. The Handley Page company's contribution to flying was a war-breaking, not a war-making, force. Finally, Sir Kingsley disclosed the interesting fact that this country is at present spending £2 million a week on aircraft.

### *Not so Pacifist*

Lord Londonderry recalled that when he was Air Minister he made a humble request for three more squadrons to add to the few we already had, and was told that he was a bloody-minded man and a war monger. He was not allowed to tell the country about those three squadrons, but next day *The Daily Telegraph* came out with a little intelligent anticipation and pointed out that what the country wanted was three more squadrons. He made a diplomatic mistake in asking for three more bomber squadrons, but at least he did help to keep the R.A.F. alive and to make the present work of Sir Kingsley Wood a little more easy.

He would now like to see the British Empire do a little less of " turning the other cheek " and a little more of telling the world that we had lasted a long time, that we were friendly with France and America, that we held all the strategic points in the world, and that we were getting tired of being browbeaten.

Mr. S. R. Worley said that he had been associated with Handley Page, Ltd., for 15 out of the 30 years of the firm's existence. He had seen the firm come through difficult times, and but for the slot patents it might have gone under. As for Mr. Handley Page himself, Mr. Worley would like to pay a tribute to him for the way in which he had inspired all members of the staff to do their best. His outstanding characteristic was his extraordinary patience in dealing with Government departments!

Mr. F. Handley Page referred to the camaraderie which exists among flying people. It far transcended national considerations. They had to deal with natural problems compared with which national problems were insignificant. He then paid a tribute to the work of other British pioneer firms such as Sopwith, De Havilland, Fairey, Bristol and Shorts. He hoped that during the next 30 years aviation would be used for peaceful purposes, and paid tributes to his old fellow workers Volkert, Easy and Hamilton, and to the charge hands, foremen and journeymen, those silent workers who had been the real backbone of the company. He concluded by saying that the aircraft industry would not allow itself to be exploited by promoters, but on the other hand it should not be pilloried by politicians for making profits. The hard times through which firms had passed should be taken into account.

### *Indiscretion*

Rear Admiral Sir Murray Sueter, referring to Lord Londonderry's request for three squadrons, said he recalled that when he was at the Admiralty he had difficulty in getting three aeroplanes. Mr. Handley Page came to him at the Admiralty in 1915 and said he had been turned down by the War Office; what was he to do? Sir Murray had confidence in Mr. Handley Page and gave him his first order for larger bombers. For that he (Sir Murray) was called the biggest damn fool in the Admiralty! The gallant admiral then, somewhat indiscreetly, gave figures showing not only present but future production rates at Cricklewood. These we refrain from repeating.

Lt. Col. Moore-Brabazon paid a warm tribute to Mr. Handley Page and his continuous good work, not only as a designer and constructor but as a contributor to the Royal Aero Club and the Royal Aeronautical Society. He referred to his bigness, physically and mentally, and to what he described as his cheekiness, an attribute which made him (Lt. Col. Moore-Brabazon) think that Mr. Handley Page was the maker of H.P. sauce! He referred to the fact that as an inventor Mr. Handley Page had saved lives by his slotted wing, and regretted that he had not put a penny in the slot in the early days!

Referring to Lord Londonderry, he said that anyone who wore a twice-around necktie was suspect, and that when Lord Londonderry came to the Air Ministry they expected a surfeit of the Londonderry Air. They were mistaken, and Lord Londonderry did well in very difficult times. It was thirty years since he ("Moore-Brab") flew a circuit of one mile and won a prize. He expected to give a dinner on the 50th anniversary of that event, and hoped by then people would have come to look upon flying not as a menace but as a benefit to mankind and a means of knitting nations together. That was what the pioneers dreamed of and worked for and died for.

## *Forthcoming Events*

**JUNE**

Sat., 24th - Thurs., 29th. Hungarian Touring Club Magyar Pilota Picnic.
Sat., 24th. Royal Air Force Garden Party.

**JULY.**

Sat., 1st. South Staffordshire Aero Club: Walsall Air Display.
Opening of Grangemouth (Scotland) Airport by Lord Trenchard.
Lancashire Aero Club. Garden Party at Woodford.
Fri., 7th. National Women's Air Reserve: Ball, Hyde Park Hotel, London.
Sat., 8th. Official Opening of Birmingham Airport (Elmdon) by H.R.H. the Duchess of Kent.
Sat., 8th-Sun., 16th. National Gliding Contests, Great Hucklow.
Sat., 8th-Sun., 23rd. Brussels Aero Show.
Sun., 16th-Sun., 23rd. Italian Aero Club: Littorio Rally, Rimini.
Sat., 22nd. Gosport Reunion, Brooklands.
Sat., 22nd-Tues., 25th. Deauville and Plantagenet Air Rallies France.
Tues., 25th. Alliance Française: Bleriot Channel Flight 30th Anniversary Banquet, Dorchester Hotel, London.
Fri., 28th-Sun., 30th. Cannes Aero Club: Deauville-Vichy-Cannes Rally.
Sat., 29th. Civil Aviation Benevolent Fund Air Display, Redhill.
Sat., 29th-Sun., 30th. Frankfurt International Flying Meeting.

**AUGUST.**

Sat., 5th. Cinque Ports Flying Club: Folkestone Aero Trophy Race.
Sat., 12th. Eastbourne Flying Club: Flying Display and Garden Party.

**SEPTEMBER.**

Sat., 2nd. King's Cup Race and Wakefield Trophy Race, Birmingham.
Sun. 3rd. Gordon Bennett Balloon Race, Poland.
Sat., 16th. Cinque Ports Flying Club: Wakefield Cup Race
Sat., 23rd. Cardiff Aeroplane Club: London-Cardiff Race.

**OCTOBER.**

Sun., 1st. Aero Club de France: Coupe Deutsch de la Meurthe, Etampes.
Mon., 2nd-Sun., 17th. Milan Aero Show.

# COMMERCIAL AVIATION

**FLOATS FOR SUMMER: One of Canadian Airways' Junkers W.34 (Pratt and Whitney Wasp) about to take off from Confederation Lake, Ontario.**

## THE WEEK AT CROYDON

*"A.Viator" on Queer Cargoes, Runways, Beer with the Bacon, and Bother on the Tarmac*

DE HAVILLAND Frobisher or "F" class liners of Imperial Airways, *Fingal*, *Fiona* and *Fortuna*, are doing yeoman service on the Paris route, and *Ettrick* and *Eddystone*, of the Armstrong Whitworth Ensign or "E" class, seem to be hard at work, whilst more of the "E" class are expected daily. Apropos this American equipment business, one feels that the best way to get the aircraft and engines which were so necessary was to have bought abroad five or ten years ago and then to have said to our manufacturers at home, "Now give us something on the same lines but better." It would have been produced all right, for, when roused, nobody can do so thorough a job in any walk of life as can the Britisher.

Some of the queer cargoes we have had lately—owing partly, perhaps, to the boom in air freight—include emeralds, diamonds and diamond dust, currants, corn, salt herrings, live squirrels, dead squirrels (in the form of fur coats), chemicals, wireless parts, machine tools, tobacco samples, mangoes, sample bricks (light to drop, Government servants, for the use of), and various insects for experimental purposes, such as a mockery of mosquitoes, an apparition of aphides and a ferocity of fleas.

Flowers and fruit have been arriving steadily by K.L.M. night freighter around 1.30 a.m. to catch the early morning Covent Garden Market. About three tons of strawberries and three tons of flowers reached Croydon from Holland a week or so back.

Pilots tell me that the new Oslo airport, Fornebu by name, is magnificent; it is hewn out of solid rock and is entirely of asphalt as to its surface. All this landing on grass, mud and dust is silly and out of date; what we want is asphalt or a proper system of concrete runways, marked as at Schiphol, Amsterdam, with numbers. Pilots are allocated their runway number when approaching, and a lot of difficulties and anxieties are avoided, especially with service trainees buzzing around all the time.

Last Saturday Imperial Airways held their sports, and a very jolly, well-organised function it was. Southampton sent a perfectly paralysing tug-of-war team in Rugger kit; they could undoubtedly have pulled the leaning tower of Pisa straight. Amazingly swift and pretty ladies raced and it struck me that a young man would have difficulty in avoiding capture if chased. There was one of those genial tents marked "All Day Licence" and there's nothing so good as a pint of bitter at 4 p.m. when lesser folk are seeking the tea tent, because normally you can't get beer then. Don't say "tut tut"; your great-grandfather probably took his pint of ale at breakfast time and it did him a power of good.

Danish Air Lines' first Focke-Wulf-Condor is registered OY-DAM., and the second one to appear here at Croydon is called OY-DEM—which as Mr. Mantalini ought have said, seems demnition refeened.

Danish air hostesses, by the way, wear the most attractive kit of the lot—smartly cut light grey flannel suit and natty forage cap to match, with pale blue shirt and dark blue tie.

Incidentally, why should dark blue be the colour of most air companies' uniforms? It shows a paucity of imagination to follow the lead of Navies and Merchant services, and dark blue gets dusty and looks shabby so quickly. Swissair seem to me to be on the right track with their Air Force blue uniforms.

### *Ground Control*

It is time we had some sort of actively functioning tarmac harbourmaster at Croydon. I have just seen a small Belgian-registered private machine (temporarily abandoned by its owner in a berth urgently required by an arriving "F" class aeroplane of Imperial Airways) rocking like a row boat in the wake of the *Queen Mary*. Reason for the near wrecking of the smaller craft was a tri-motor, curiously enough of Sabena, running-up just ahead. Ultimately four men rushed out to hold the small machine down, then removed chocks from behind its wheels and tried to push it forward, up hill and against the artificial gale. The result was that the whole outfit was wafted away backwards out of control, with every man asking his neighbour why the so-and-so he did not do something about it. Luckily the Commander of *Fingal* saw what might happen and stopped well clear of the proceedings, otherwise an "F" class liner might have been put out of service. That is not so funny, and goes to show that private owners and such are allowed to park where they like, and its nobody's business to control their actions or their machines.

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### *The Reward of Patience*

AS inferred recently by "A. Viator" in his weekly comments, the K.L.M. Amsterdam-Liverpool service is obtaining quite an appreciable amount of traffic this season. During the first two weeks of the service seventy-two passengers travelled between Holland and Manchester, the figure for the second fortnight increasing to ninety, while freight loads over the same period amounted to 2,646 lb. and 4,550 lb. respectively. These figures are not really outstanding, but they are very much better than those of previous years, and show that persistence and regularity have their results. Incidentally, at least one Manchester passenger has left on a through journey by K.L.M. to Karachi.

**Commercial Aviation**

## The Indian Ocean Survey

AFTER completing a survey of the Cocos Islands, taking photographs and making detailed soundings in the lagoons, Capt. P. G. Taylor left for Diego Garcia, 1,725 miles away, at 10.25 G.M.T. on June 13. His machine, a special Consolidated PBY, reached its destination after an uneventful flight of 14 hr. 17 min., at an average speed of 121 m.p.h.

After a survey had been carried out, the *Guba* left Diego Garcia at 12.40 a.m. (G.M.T.) on June 15 and arrived at Mahé, in the Seychelles, at 8.42 a.m. (G.M.T.). Apparently, according to a message sent by Capt. Taylor to the Australian Government, there will be no difficulty in laying out an aerodrome at Diego Garcia and the lagoons there should make natural bases for flying-boats. The Seychelles are only about a thousand miles from Mombasa, the next stop, and by the time this issue appears the machine may have reached this point.

## The Hoogly Accident

THE Imperial Airways boat *Centurion*, carrying four passengers and a crew of five, crashed and sank while landing on the Hoogly river on the evening of June 12.

According to the official statement a sudden north-westerly wind lifted her tail and caused the machine to nose into the water. It seems more likely that the extremely gusty conditions caused the machine to stall during the final part of the approach. At any rate, the hull was seriously damaged and the machine sank. One of the passengers suffered a fractured thigh.

## Atlantic Passengers

On June 17, the Boeing 314, *Atlantic Clipper* left Port Washington on the first passenger-carrying trans-Atlantic service. The passengers in this case, however, were not of the fare-paying variety. Sixteen were journalists or broadcast experts, and two were P.A.A. officials. The remaining twelve persons making up the total of thirty on board consisted of the Boeing crew, headed by Capt. Culbertson.

The machine left at 3.54 p.m. and arrived at Horta, in the Azores, at 7.02 a.m.—these being New York summer times. Lisbon was reached on the evening of June 18.

The first true passenger service will start on Wednesday, June 28, and the regular service will be between Port Washington and France, via the Azores and Lisbon; the machines will not fly on to Southampton. In the meantime, a third Boeing, named *Dixie Clipper*, has been put into service and has made one return crossing.

On our own side, the first of the 31½-ton "G" class Short boats was launched at Rochester last Saturday. This particular machine, *Golden Hind*, has been laid out purely as a mail-carrying machine. Its maximum non-stop range will be something more than 3,000 miles.

## Practical Fog Dissipation

ALTHOUGH the expense involved in so doing may be somewhat prohibitive, it has at least been proved that it is possible to dissipate certain types of fog by artificial means. "Radiation" fogs still, apparently, remain immovable, but fogs caused by the inflow of damp, warm air over a cold surface, which have a measurable speed of motion, can be reduced or even removed by the application of local heat treatment along a line to the windward side of an aerodrome.

According to Prof. David Brunt, in an article which he has recently written in *The Journal of Scientific Instruments*, dissipation by heat is a practical method. On the assumption that 5 per cent. of the moisture in a fog of this type is in the form of droplets, that the temperature increases between the base and the top of the fog layer by 5 deg. C., and that the rate of drift is 1 metre per second, he calculates that by burning 7,500 cubic feet of domestic gas every minute—or 20 gallons of paraffin—a space 100 metres high could be cleared to leeward.

Apparently only 13 per cent. of the heat produced is needed for evaporating the droplets, the remainder being required partly to secure a reversal of the temperature gradient in order that the upper layers may be heated by convection, and partly to counteract the addition of further moisture through the combustion process.

Such a large use of gas from the ordinary supplies would not normally be possible, and Prof. Brunt favours the idea of laying down paraffin pipe-lines with burners arranged three or four metres apart. Preliminary experiments appear to have yielded practical results, though whether these results justify the outlay and running costs of the system is another matter.

## An Imperial Retirement

IN September, Mr. H. L. Hall, who has been chief engineer of Imperial Airways during the last fifteen years, will retire from active service, though continuing to serve as a consultant to the company. He entered the Royal aircraft factory at Farnborough in 1912, after twenty-two years' previous experience of engineering and factory organisation, and is in his sixty-third year.

## Difficulty in Australia

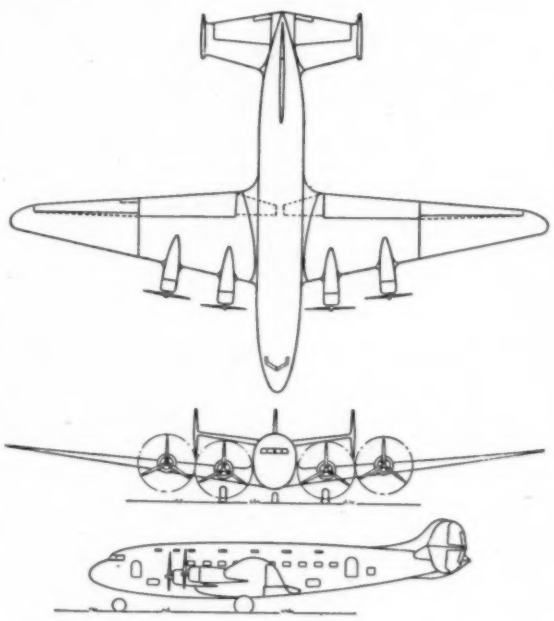
ANSETT AIRWAYS, the Australian transport company, have had to discontinue their Sydney-Melbourne service, largely because of competition and the loss sustained when one of the company's three Lockheed 10As was destroyed in a hangar fire at Melbourne. After the loss, Ansett attempted to maintain schedules with a chartered D.H. Rapide, but this obviously could not compete favourably with the Douglases of Australian National Airways. Also, Ansett's last financial report showed a heavy loss, and the company is, unlike A.N.A., unsubsidised. Ansett's are continuing, however, to operate services from Sydney to Narrendera, Mildura, Broken Hill and Adelaide; from Melbourne to Broken Hill; and from Melbourne to Hamilton.

It had been hoped that, under the Civil Aviation Department's scheme of avoiding uneconomic competition, Ansett and Australian National could have been amalgamated. Negotiations towards this end were carried on for nearly a year without success. The company is still awaiting the Civil Aviation Department's long-promised review of the allotment of subsidies.

## D.C.4 Figures

NOW that, after a year of flight-testing, both privately and officially, the Douglas D.C.4 has received its Civil Aeronautics Authority approved type certificate, it is possible to give some final and definite performance figures—at least with the engines fitted to the prototype.

The top speed is 245 m.p.h.; the cruising speed, at 65 per cent. power, is 199 m.p.h.; and the landing speed, with full load, is 70 m.p.h.; service and absolute ceiling are 22,800 ft. and 24,600 ft. respectively. Other figures are:—Span, 138ft. 3in.; length, 97ft. 7in.; height, 24ft. 6½in.; all-up weight, 60,000 lb. (65,000 lb. on production models); and useful load, 20,000 lb.



General arrangement of the Douglas D.C.4.

For daylight operations the D.C.4 is designed to carry forty-two passengers and as a sleeper, thirty or thirty-two, according to the layout—with a crew of five in each case. The engines of the prototype are Pratt and Whitney Twin Hornets which give 1,400 h.p. for take-off. Later machines may have Wright two-row Cyclones.

## Imperial Flickers

LAST week Imperial Airways had the excellent idea of inviting a number of their friends to a film show at the Cambridge Theatre, London. Four films were shown, of which three were of the so-called "documentary," or realist type. That is to say, they were films intended to give a true picture of the activities of Imperial Airways, rather than to be entertaining in the popular sense. In this they succeeded admirably. The fourth, called *Colour Flight*, was very clever, but personally we found the flickering of wriggly bits of colour across the screen so trying to the eyes that we had to look away.

*Aerial Milestones* told the story of British air transport from the beginning, and was virtually the film of the story which we told in *Flight* of June 15.

*Sydney Eastbound* was designed to illustrate the ground organisation of Imperials, and right well it did so. A rather sad note was lent to *Wings Over Empire* by the fact that the late Sir Philip Sassoon took a great interest in the making of this film, and his voice was actually heard, although the scenes in which he took part had been deleted from the film.

All the films were produced by the Strand Film Company, and we understand that they may be borrowed by arrangement with Imperial Airways.

## Grangemouth Opening

THE new central Scottish airport at Grangemouth, Stirlingshire, will be officially opened on July 1 by Viscount Trenchard. There will be a preliminary luncheon in the airport buildings.

This airport, though now primarily a Volunteer Reserve centre, has been laid out in accordance with the recommendations of the Maybury Committee, since it acts as a central terminal for the industrial district of Scotland, and lies approximately half-way between Edinburgh and Glasgow. The landing area is one of the largest in Great Britain, with a minimum run of 1,300 yd. and a maximum run of 1,500 yd. In due course extensions will be made to give runs of 2,000 yd. in all directions.

As we have previously remarked, one of the more remarkable features of Grangemouth has been the speed at which the work has been carried out. This was started on February 6, the aerodrome was licensed and was in use by North-Eastern Airways on April 17, and R.A.F.V.R. training started on May 1.

## A D.C.3 for Air France

IN addition to the very large order of more than 700 machines for military purposes which has been placed by France in the U.S., it is noteworthy that Air France, which hitherto has employed only machines of French manufacture, have placed an order for a fourteen-passenger Douglas D.C.3. This machine will be employed on the Buenos Aires-Santiago de Chile section of Air France's long-distance weekly service from Europe to South America, which crosses the South Atlantic between Dakar and Brazil.

The route over the Andes, which are 20,000ft. high, was pioneered by Guillaumet, the Air France pilot, who is in charge of the flying-boat tests now restarted over the North Atlantic. American aircraft (Sikorsky S.43s) are also used by Aeromaritime, the coastal airline in West Africa, and also (Lockheed 14s) by Air Afrique, the French trans-African service.

## Non-Surcharge in Australia?

AUSTRALIA may soon see an end to the vexing surcharge on overseas and internal air mails. At present her citizens pay 3d. a ½oz. on air mails in addition to the normal 2d. postage, the excuse being that the revenue collected will pay subsidies to civil aviation. The fact is, however, that hardly any other nation pays such a surcharge, and that the Australian Post Office could well afford to pay the revenue surcharge itself. For years its profits have been in the millions category.

However, the new Australian Minister for Civil Aviation, Mr. Fairbairn, is now taking up the surcharge question and hopes are high that it will eventually be abolished. Concurrently, the Federal Ministry is also investigating the possibility of starting night mail services on the inter-state routes. Mr. Fairbairn has already indicated that he favours the introduction of night flying and that, if it can be shown to be practical, he will consider the scheme when he reviews the long-range plan for commercial aviation within the next few months.

Aircraft operators with a long experience of Australian conditions say that night flying is actually preferable in south-east, north, north-west and central Australia. And the Civil Aviation Department, although not prepared for the immediate commencement of night flying, has made a start with the necessary ground organisation.

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## The Tragedy of Nick Comper

THE aviation community learned with something of a shock of the tragic death of Flt. Lt. Nicholas Comper at Hythe last Saturday night. He was found unconscious, with a fractured skull, in a street in Hythe, and on the following Monday a man was charged with manslaughter.

"Nick" Comper, who was 42, was in many ways a clever designer, and yet he somehow always just failed to "get there." One felt that he was solely cut out for a designer, and should never have attempted to enter the commercial sphere, for which he was temperamentally quite unsuited. So long as he confined himself to the technical aspect he did very well. But in a managing director's chair he never seemed to fit quite happily.

In addition to his service in the R.A.F. Comper had technical training in the De Havilland Aircraft Co., Ltd., and at the N.P.L. His first aeroplane was the little "Cranwell II," which he designed in 1923, and which was built by members of the Cranwell Light Aeroplane Club (Comper was at that time a lecturer at Cranwell) and took part in the Lympne light plane competition of 1924.

Of the series of small aeroplanes designed by Comper, such as the Mouse, the Streak, and the Kite, it will always be the little Swift with which one automatically links his name. This tiny little strut-braced monoplane was fitted as standard with the Pobjoy engine, but racing versions had the Gipsy engine and proved extremely fast for their power.

At the time of his death Comper was looking forward to the first test flights of a small pusher monoplane which he had designed for students of the College of Aeronautical Engineering to build. This machine is now nearly ready, and Comper had recently received some very promising enquiries from abroad for rights to build under licence.

That "Nick," as we all affectionately called him, should be lost in such tragic circumstances will be deeply regretted by everyone who knew him, and there were few in British aviation who did not.

## A R.Ae.S. House-warming

THE Royal Aeronautical Society had the happy inspiration to make this year's Conversazione a house-warming at the Society's new home at 4, Hamilton Place, London, W.1, last week. In the past this event has been held at the Science Museum, South Kensington, and the somewhat austere if august surroundings did not exactly conduce to light-hearted enjoyment. In the new premises of the Society there was a feeling of being at home which South Kensington could never inspire, and the result was that everyone had a most enjoyable time. So numerous were the guests that it would have been quite impossible to get them all into the building at one time, and so "Mr. Fedden's Party," as the event is universally regarded, had to be held twice, once on Friday evening and again on Saturday.

Everyone in British aviation seemed to be at the two parties, and those who think of our technicians as slide-rule merchants with no more frivolous thought in their minds than the calculus would have been surprised to see how even a mathematician can become very human indeed, once he unbends.

The wonderful new library was used for dancing, and the weighty tomes around the walls did not seem to have a noticeable mass-balancing effect on the dancers' feet. In the courtyard at the back of the house a most effective *biergarten* had been laid out, and there one heard technical discussions intermingle with light-hearted badinage.

In addition to members of the R.Ae.S. there were present many foreign air attachés and representatives of the Air Ministry. The outstanding point about the event was the atmosphere of a "family party." Everyone knew everyone else, and for once one was able to appreciate how many amazingly charming wives there are in the aviation community.

# CORRESPONDENCE

*The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## VISIBLE VORTICES

### *Some More Experiences*

HAVING flown many hours in the Hampden prototype and in the production version of that aircraft as observer for flight trials, I would like to confirm your statement regarding the airscrew-tip vortices shown in the photograph on page 601 of *Flight* last week.

I tried on many occasions to photograph the phenomena, which occurred, in the majority of cases, on a day when humidity was high and especially when the aircraft was flying just under a cloud-base.

Also, last week, I was fortunate enough to see the wing-tip trailers from a Hurricane "aerobating" over Northolt.

Pinner. OBSERVER.

## EMPIRE AIR DAY CRITICISMS

### *Air Comdre. Chamier Replies*

YOUR correspondent "J. L." suggests that we want more miniature Hendons on Empire Air Day.

When Empire Air Day was first suggested by the Air League *that* was the argument raised in the Air Ministry—"It is impossible to organise fifty to a hundred miniature Hendons, and therefore Empire Air Day is no good." The Air League's answer to that was that the public would come to see the life and activities of an R.A.F. station. They would be interested in workshops, armouries, parachutes, and photography, and in all the details of an airman's life; flying, as far as possible, should be added as an attraction.

That is still the spirit of Empire Air Day; the invitation is from "Aviation 'At Home' to the public." And the public enters into the spirit of the day—not to be "entertained by something happening all the time," but to show their interest in, and support of, British aviation. J. A. CHAMIER,

London, W.C.2. Secretary-General,
Air League of the British Empire.

### *Permanent Exhibition Suggested as Alternative*

THERE are grounds for further criticism of Empire Air Day in addition to that expressed by "J. L." in his letter from Glasgow. He says: "The public are rolling up in greater numbers to these R.A.F. 'at homes,' but they are not being entertained as the occasion demands." He understates the case. I say that not even sufficient arrangements are made for their reception.

Members of the public who visited, or tried to visit, a certain station near London on Empire Air Day might well think otherwise. The traffic and parking arrangements were so bad that many people never succeeded in getting near the station at all! After waiting in the queues for what seemed an interminable period they finally gave it up as hopeless and went home. Some people of my acquaintance never got nearer than seven miles of the camp they had intended to visit. There was a traffic hold-up some ten miles long, and lots of people spent literally hours in the bus. I believe I am right in saying that no extra buses had been arranged for on that day despite that the situation cried aloud for an extensively augmented service. The objection may be raised that it was no fault of the authorities that so many thousands of people should elect to converge on one small Station all at more or less one and the same time. But the possibility of such huge crowds should have been foreseen, and adequate arrangements to cope with them made accordingly. I am told that a similar situation has occurred on previous years. This year, at any rate, it could only be described as chaotic.

There was also hopeless muddle in the matter of tickets and programmes. Not that it mattered much, for, as "J. L." pointed out, there didn't seem to be much going on most of the time. Many people must have wondered, as they stood behind the fencing that prevented them from getting a good close-up of the machines in the park, what on earth they had been invited there for.

The whole camp was far too overcrowded, resembling nothing so much as Southend front on a Bank Holiday. And ask the airmen, who had to pick it all up, about the litter they left behind them!

Yes, it is true that something will have to be done about Empire Air Day. One's own humble suggestion is that the scheme should be dropped, having in place of it a permanent exhibition of the latest types of aircraft in London, where the people can, at any time they wish, get all the information they want on aircraft development, the proceeds to go to Air Force charities in the same way as is at present the case with Empire Air Day. This would have many advantages, the chief, perhaps, being that it would leave the R.A.F. free to get on with its real business of training.

If it be objected that by such a scheme the public would be deprived of the flying part of the display, my reply is that most people are getting rather blasé about formation flying, aerobatics and so on anyway, and in any case they can always see flying at any R.A.F. station almost any day.

An added advantage would be the lessening of the risk of a major disaster due to a machine crashing into the crowd. After all, was not this possibility—a very real one—one of the main reasons for the abolition of the Hendon Display? The crowds at Empire Air Day displays are gathered equally as densely as those at Hendon were. A. F.

London, S.E.

## UNORTHODOX TRANSPORT

### *Three Hundred Miles with a Fuselage on a Car Roof*

I NOTICED in the June 8 issue of *Flight* a photograph of the fuselage of my Avian on the roof of my 10 h.p. Lanchester, by which means I transported from Rearsby (Leics) to Gatwick and back, a total of about 300 miles.

**The photograph referred to by Mr. V. H. Doree.**

As it apparently caused some comment, perhaps the method of securing would also be of interest. An upright from the floor to a plank across the roof inside the car supported the roof. Two planks across the top of the roof were securely tied to the chassis. Four old tyres formed a cradle for the fuselage to rest on. The fuselage was lashed to it to prevent swaying, but at the same time a certain amount of movement was allowed.

Speeds up to 30 m.p.h. were attained and no trouble experienced. The springs on this car are slightly heavier than standard. I can thoroughly recommend this method of transport, and the saving was considerable.

Incidentally, Southern Motors carried out the repair, and not the firm mentioned, the other C. of A. work being carried out by the County Flying Club. V. H. DOREE.

Kirby Muxloe, Leicestershire.

## AIR EXERCISES

### *Co-operation with France Suggested*

ROYAL Air Force air exercises, as at present conducted, appear to me to have one weakness. The "battles" that take place between "Redland" and "Blueland," admirable as they are, constitute a country divided against itself. Both sides are using machines that are familiar to all and sundry of the personnel engaged, while the country over which they are operating is, more often than not, equally familiar to everyone.

May I suggest that, since the liaison between this country and France is so strong and so mutual in its object, it would be of advantage to each country not to attack itself in mock warfare, but to attack the other?

An air raid on Paris would give our striking force new practice over unfamiliar country, and would bring them face to face with new defence methods, while unfathomed factors would arise in competing with French fighters.

London, W.1. ROGER MORTIMER.

# THE INDUSTRY

## Reversed Flow

IN normal times one frequently finds officers of the R.A.F. or of the Air Ministry gravitating towards jobs in the aircraft industry. Recently there seems to be a tendency to reverse this procedure, and for members of the aircraft industry to pop up suddenly in the Air Ministry. The latest issue of The Air Force List shows two examples, both in the Directorate of Aircraft Production. Major Jack Stewart has become one of three Assistant Directors of Aircraft Production, and Mr. W. H. Mace has become a Senior Production Officer.

## For Marine Aircraft

UNTIL quite recently it was taken for granted that a sea anchor had to rely on its own weight to force the flukes into the sea bed. For obvious reasons, such an anchor for flying boats and seaplanes would present an acute pay-load problem. Research has been carried out in most countries to secure efficient lightweight anchors for counteracting the heavy drag of large aircraft swinging under the gusty conditions, choppy seas and the strong tidal currents which are frequently encountered in some estuaries.

In America, experiments by the Northill company resulted in a light folding anchor which, in spite of weighing only 12lb., has been tested under actual working conditions up to a drag load of 720lb. Some idea of its efficiency can be gathered from the fact that the weight of a naval stockless type anchor designed to withstand the same load would be approximately 300lb., and in certain instances, even more.

The Northill anchor is made of high-tensile alloy steel possessing non-magnetic and corrosion-resisting properties. Both the fluke and stock arms are of the folding type, and when extended are locked in position by simple spring catches. The anchor, which is available in various sizes weighing from 6lb. upwards, is handled in this country by E. P. Barrus, Ltd., 36, Upper Thames Street, London, E.C.4.

## Airline Coach Comfort

LOCAL traffic regulations set a difficult problem for the builders of the Guernsey and Jersey Airways passenger coach, which operates from Guernsey airport. To comply with these regulations the overall width of the coach was restricted to 6ft. 6in., i.e., one foot less than is allowed in this country. The coachbuilder, Mr. W. L. Thurgood, of Park Road, Ware, Herts, co-operated with Vauxhall Motors, Ltd., and produced a luxury-type 20-seater coach built on a special chassis with single rear wheels, which allows seating three abreast—two on one side of the gangway and one on the other. The body is equipped with a front sliding door entrance on the near side, a large luggage locker, sunken gangway, opening roof and many other modern features.

## When Demand Outpaces Supply

AT the present moment many works managers in the aircraft industry are faced with the serious problem of obtaining new machinery to relieve or replace their already heavily taxed plant. Prices have a rather natural tendency to rise when supply cannot cope with demand. Satisfactory alternatives are difficult to arrive at, but on a recent visit to Coventry we were able to see at least one method whereby an efficient compromise can be effected.

One of the main side lines of Modern Machine Tools, Ltd., of The Butts, Coventry, is the rebuilding of expensive machinery. Here machines are dismantled in the specially equipped works and thoroughly rebuilt to guaranteed makers' limits of alignment accuracy. Every component of each dismantled machine is carefully scrutinised by specialised inspection engineers, new pinions fitted where necessary, together with bushes, etc., and on final assembly the machine undergoes a series of accurate tests. The cost of such an overhaul is, roughly, in the ratio of £200 for a machine originally worth £1,000.

Modern Machine Tools, Ltd., besides being machine overhaul specialists, are factors for many interesting ranges of capstans, automatics, grinders, millers, etc., and they also make a complete range of machines themselves.

One interesting item which this company manufacture is a useful rack-cutting attachment for fitting to Fellowes gear shapers. This attachment can be fitted without any major modification to the machine.

## Airscrew Overhaul Periods Extended

SINCE July 30, 1935, when the first c.p. airscrew was delivered from the De Havilland Edgware factory, several thousands have gone into service in various parts of the world and well over a million flying hours of operating experience have accumulated.

Overhaul periods of the De Havilland-built airscrews have been controlled with a rigidly conservative policy while these million hours of service have accumulated, and the normal analytical study of every operator's experience has proceeded throughout the four years.

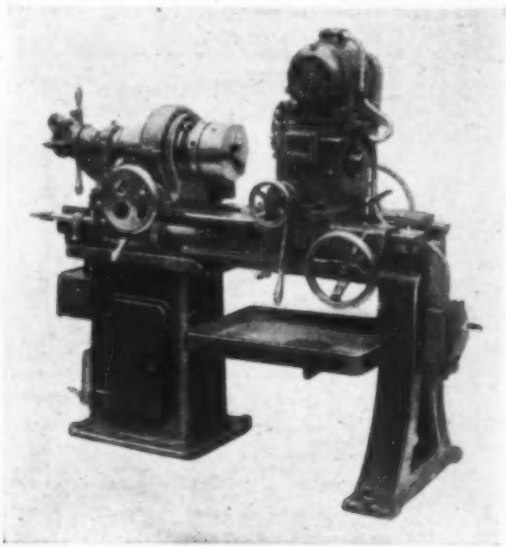
As the outcome, D.H. Airscrew Service Bulletin No. 6 has been issued to all operators, extending the overhaul periods to standardised figures of 350 and 400 hours.

These periods are applicable forthwith to all D.H. sizes from the 1,000-size for engines up to 250 h.p. (notably Gipsy Major II and Gipsy Six II) to the 5,000-size for engines up to 1,500 h.p. As the earliest designs were of the two-pitch type it follows that the two-pitch installations have been approved for the longer duty periods—400 hours against 350 hours for the more recent constant-speed examples.

As the basis for further extensions in the future, it is stated, certain airscrews have now been allowed to run to 500 hours between overhauls, and with highly gratifying results.

Many D.H. airscrew installations have impressive figures of total service.

**A folding Northill anchor, of the type illustrated, and weighing 12 lb., is capable of withstanding a load of 720 lb.**



**Thread-milling machine by Modern Machine Tools, Ltd.**

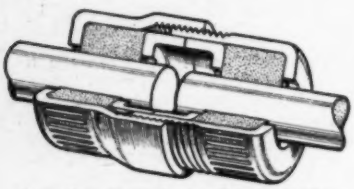
## The Industry

One of the best examples claimed is that of Imperial Airways, whose 5,000-size controllables, on the Short Empire flying boats, have recorded half a million airscrew hours in widely varying operating conditions.

* * *

### Coupling Without Frictional Loss

A NEW method of employing rubber in a special coupling whereby, it is claimed, full power can be delivered through two coupled shafts without resultant loss from friction or misalignment has been recently introduced into this country from America.



**A section through the Harris Torflex coupling.**

Known as the Harris Torflex flexible coupling, this new device is self-aligning, and consequently cannot whip. It is also self-fastening, and requires no keying or milling of the shafts.

The coupling consists of two "thimbles," one of which screws into the other. Into each thimble is fitted a rubber bush, abutting against the inner faces of which are two metal collets. The fitting is slid over the ends of the two shafts to be coupled and, when the two thimbles are screwed into each other, the rubber bushes are compressed endwise as the two collets come into contact with one another. The rubber is then caused to take a firm frictional grip of the end of the shaft.

Torflex couplings can be used for direct drives on shafts having a diameter up to 1¼in. They are being handled in this country by Howard Graham, Ltd., of 4, Tiddington Road, Stratford-on-Avon.

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### In Brief

The British Aluminium Co., Ltd., will transfer its branch office and aluminium warehouse from 25-29, Pancras Road, London, N.W.1, as from July 1, to larger premises at Park Avenue, North Circular Road, London, N.W.10 (Telephone: Willesden 4817 and 4818). The new depot will be under the management of Mr. W. J. Allen.

* * *

Nash Aircraft Sales and Hire, Ltd., of Croydon, have been appointed agents for the new Wicko at Croydon and Gatwick. They have a demonstration machine available

* * *

On Tuesday of last week, June 13, Mr. Matthew Wilks, J.P., was presented with a silver tea set by the managing directors of Thompson Brothers (Bilston), Ltd.—Messrs. F. S. and H. J. Thompson—in recognition of his fifty years' service with the Company. Mr. Wilks joined the Company at the age of 13, and since then has risen steadily from being a sheet metal worker to manager of the acetylene and electric welding departments—a position which he holds to-day.

* * *

Technical Improvements, Ltd., have found their works off the Walworth Road too small to cope with the ever-growing volume of business, and yesterday they moved to new works totalling nearly 12,000 sq. ft. in area, in Power Road, Gunnersbury, London, W.4. The new telephone number is Chiswick 4646-47.

* * *

The application of air survey work to town planning and housing development is a feature of the Housing Centre Exhibition, at 13, Suffolk Street, London, W.1. The exhibition includes a display of aerial photographs taken by Aircraft Operating Co., Ltd., showing housing development, map revision methods and how, by means of a model, aerial survey work is carried out. The exhibition is open until next Saturday, June 24, between 10 a.m. and 5 p.m. (10 a.m. to noon on Saturday).

* * *

Coincident with the development of aircraft production in Australia, John Hall and Sons (Bristol and London), Ltd., have made arrangements for the Hardie Trading Pty., Ltd., of 581, Little Collins Street, Melbourne, C.1, to take up the manufacturing rights of John Hall's aircraft finishes, covering the complete range of British Air Ministry specifications, including dopes, matt camouflage finishes, synthetic metal finishes, cellulose lacquers, stoving enamels, seaplane and other varnishes.

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## AERONAUTICAL PATENT SPECIFICATIONS

*(Published June 8, 1939).*

30436 GOLDSCHMIDT, R.: De-icing equipment for example for aircraft (505,433).

30655 OESTERREICHISCHE UNGARISCHE OPTISCHE ANSTALT C.P GOERZ GES: Method and apparatus for determining the direction of flight and velocity of aerial targets moving rectilinearly (505,561).

31028 DE HAVILLAND AIRCRAFT CO., LTD., and THOMAS, F. M.: Mounting of airscrew blades (505,629).

31029 BENDIX AVIATION CORPORATION: Fluid-pressure brakes (505,375).

9673 AUTOMOTIVE PRODUCTS CO., LTD., CLENCH, E. C. S., and KAHL, Q. H. H.: Remotely acting liquid pressure position-indicating devices (505,305).

13463 KRAFFT, E., and WEICHARDT, R. (trading as KRAFFT & WEICHARDT): Aircraft landing sails (505,316).

16527 LORENZ AKT.-GES., C.: Radio direction-finding apparatus (505,405).

26584 BENDIX AVIATION CORPORATION: Universal joints (505,535).

30426 BARBAROU, M. J. B.: Device for mounting two aeroplane propellers coaxially and with reverse directions of rotation (505,346).

33357 TELEFUNKEN GES. FUR DRAHTLOSE TELEGRAPHIE: Radio-direction finders (505,547).

31263 HILLIER, A. (Sperry Gyroscope Co., Inc.): Magnetic compasses (505,900).

31264 HILLIER, A. AND SPERRY GYROSCOPE CO., INC.: Control devices using fluid jets (505,901).

31461 HEADEN, L. A.: Means for preventing ice-formation on control surfaces of aircraft (505,772).

31674 SOC. D'EXPLOITATION D'INVENTIONS MECANIQUES: Gun sights which compensate for relative motion between gun and target (505,905).

31764 MARCONI'S WIRELESS TELEGRAPH CO., LTD., ROBB, J. G., FURNIVAL, J. M., AND WITT, B. J.: Navigation-aiding radio transmitting installations (505,910).

31767 MARCONI'S WIRELESS TELEGRAPH CO., LTD., FURNIVAL, J. M., AND WITT, B. J.: Radio direction-finding apparatus (505,913).

5201 MERCIER, P. E.: Cowlings for air-cooled aircraft engines (505,702).

12238 CERINI, L.: Gyroscopic indicator adapted to be connected with a magnetic compass for aviation (505,715)

20925. GROVES, W. W. (Junkers Flugzeug-und-Motorenwerke Akt.-Ges.): Arrangements for preventing the formation of ice on aircraft (505,873).

34471. BLUME, W., AND ARADO FLUGZEUGWERKE GES.: Engine arrangement in multi-engined aircraft (505,907).

*(Published June 22, 1939.)*

25944. ELLOR, J. E., and ROLLS-ROYCE, LTD.: Exhaust pipes for internal-combustion engines of aircraft (506,333).

28584. SPERRY GYROSCOPE CO., INC.: Automatic or semi-automatic pilots for aircraft (506066).

28629 PAINE, H. SCOTT- (trading as BRITISH POWER BOAT CO.), and WILSON, W. K.: Means for reducing torsional oscillations in transmission systems (506,067).

32396. ELLOR, J. E.: Means for preventing the formation of ice on aircraft (506,179).

32702 SIEMENS APPARATE UND MASCHINEN GES.: Rudder servo-motors for vehicles, in particular aircraft (506,360).

32731. CIERVA AUTOGIRO CO., LTD., and BENNETT, J. A. J.: Helicopters and gyroplanes (506,404).

15871. SPERRY GYROSCOPE CO., INC.: Control devices for aircraft (506,225).

19007. LORENZ AKT.-GES., C.: Navigational apparatus for aircraft and other vessels (506,231).

20626. SPERRY GYROSCOPE CO., INC.: Automatic or semi-automatic pilots for aircraft (506,111).

26776. GLIWA, M.: Wings for aircraft (506,136).

27155 RUPP, A.: Screw propellers (506,246).

31142. MESSERSCHMITT AKT.-GES.: Variable-pitch airscrews (506,374).

31553. BELAIEFF, J. F., DELANEY, C. J., and GALLAY, LTD.: Radiators for aeroplanes and the like (506,146).

6051. SPERRY GYROSCOPE CO., LTD., NISBET, R. H., and HARDING, W. G.: Automatic steering systems for aircraft (506,379).

## PUBLICATIONS RECEIVED

*Fastest on Earth*, by Capt. G. E. T. Eyston; 7s. 6d. John Miles Publisher, Ltd., Amen Corner, London, E.C.4.

*International Index to Aeronautical Technical Reports*, 1938; 5s. Sir Isaac Pitman and Sons, Ltd., Parker Street, Kingsway, London, W.C.2.

Catalogue: *Bostik Cements*. B.B. Chemical Co., Ltd., Ulverscroft Works, Leicester.

Catalogue: *British Aluminium Co. Products*. Adelaide House, London, E.C.4.

*National Advisory Committee for Aeronautics*: Report No. 630: A Flight Comparison of Conventional Ailerons on a Rectangular Wing and of Conventional and Floating Wing-tip Ailerons on a Tapered Wing, by H. A. Soulé and W. Gracey; 10 cents. No. 639: The Effect of Compressibility on Eight Full-Scale Propellers Operating in the Take-off and Climbing Range, by D. Biermann and E. P. Hartman; 10 cents. No. 640: The Aerodynamic Characteristics of Full-Scale Propellers having 2, 3 and 4 blades of Clark Y and R.A.F. 6 Airfoil Sections, by E. P. Hartman and D. Biermann; 10 cents.

No. 642: Tests of Five Full-Scale Propellers in the Presence of a Radial and a Liquid-Cooled Engine Nacelle, including Tests of Two Spinners, by D. Biermann and E. P. Hartman; 10 cents. Report No. 644: The Torsional and Bending Deflection of Full-Scale Aluminium-Alloy Propeller Blades under Normal Operating Condiions, by E. P. Hartman and D. Biermann; 10 cents.

No. 645: Correction of Temperatures of Air-Cooled Engine Cylinders for Variation in Engine and Cooling Conditions, by O. W. Schey, B. Pinkel and H. H. Ellerbrock, Jr.; 15 cents. No. 648: Design Charts for Predicting Downwash Angles and Wake Characteristics behind Plain and Flapped Wings, by A. Silverstein and S. Katzoff; 15 cents. All from Superintendent of Documents, Washington, D.C., U.S.A.

*Vortrage über Motorlosen Flug*: Mitteilungsblatt Nr. 6 der Internationalen Studienkommission fur den motorlosen Flug; Rm 6. Verlag Von R. Oldenbourg, Schliessfach 31, Munchen, Germany.

*Meteorological Office*: Meteorology for Aviators, by R. C. Sutcliffe; 7s. 6d. H.M. Stationery Office York House, Kingsway, London, W.C.2.

*Meteorological Office Professional Notes No. 88*: Fog on the Mainland and Coasts of Scotland, by F. E. Dixon; 6d. H.M Stationery Office, York House, Kingsway, London, W.C.2.

*Primer of Internal Combustion Engine*, by H. E. Wimperis and W. J. Stern; 5s. Constable and Co., Ltd., 10, Orange Street, London, W.C.2.

*Aeronautic Radio*: A Manual for Operators, Pilots and Radio Mechanics, by M. F. Eddy; $4.50. The Ronald Press Co., 15, East 26th Street, New York, N.Y., U.S.A

*The Ground Engineer's Manual*, by A. C. Robinson; 3s. 6d. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2.

*Six Hundred Questions and Answers on Air Force Law*, by Sqn. Ldr. H. M. Shurlock; 5s. Gale and Polden, Ltd., Wellington Works, Aldershot.

*Brassey's Naval Annual*, 1939; 25s. William Clowes and Sons, Ltd., 94, Jermyn Sreet, S.W.

*Catalogue*: Smith's Aircraft Instruments Cricklewood, London, N.W.2